

## SEQUENCE LISTING

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<120> NOVEL PLANT ACYLTRANSFERASES SPECIFIC FOR LONG-CHAINED, MULTIPLY  
 UNSATURATED FATTY ACIDS

<130> 13478-00002-US

<150> PCT/EP2004/003224

<151> 2004-03-26

<150> DE103 14 759.4

<151> 2003-03-31

<150> DE103 48 996.7

<151> 2003-10-17

<160> 122

<170> PatentIn version 3.3

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<223> LPAAT

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Ala Lys Thr Ala Val Gly Leu Leu Thr Leu Ala Pro Ala Arg Ile Val
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Phe Leu Val Thr Val Leu Gly Thr Tyr Gly Leu Thr Val Ala Ala Cys
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acg cga ctt ggc gtc ccg aaa agc ttc gtg ctg ggc ctg acg cgg tgc      199
Thr Arg Leu Gly Val Pro Lys Ser Phe Val Leu Gly Leu Thr Arg Cys
                                   40      45      50
gtc gcg cga ctc acg ctc tgg ggg ctt ggg ttc tac cac att gag gtc      247
Val Ala Arg Leu Thr Leu Trp Gly Leu Gly Phe Tyr His Ile Glu Val

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| aac cac gtc tcg tac ctg gag atc ttg tac ttc atg tcg acc gtg cac    | 343  |     |  |     |  |     |  |
| Asn His Val Ser Tyr Leu Glu Ile Leu Tyr Phe Met Ser Thr Val His    |      |     |  |     |  |     |  |
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| tgc ccg tct ttc gtc atg aag aag acc tgc ctc cga gtc ccg ctt gtc    | 391  |     |  |     |  |     |  |
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| ggc tac att gcc atg gag ctg ggc ggt gtg att gtg gac cgc gag ggc    | 439  |     |  |     |  |     |  |
| Gly Tyr Ile Ala Met Glu Leu Gly Gly Val Ile Val Asp Arg Glu Gly    |      |     |  |     |  |     |  |
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| ggc ggt caa agc gca tcg gcg atc att cgc gac cgc gtg cag gag cct    | 487  |     |  |     |  |     |  |
| Gly Gly Gln Ser Ala Ser Ala Ile Ile Arg Asp Arg Val Gln Glu Pro    |      |     |  |     |  |     |  |
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| cct cga gat tcg tcg agc gag aag cac cac gcg cag ccg ctt ctt gtg    | 535  |     |  |     |  |     |  |
| Pro Arg Asp Ser Ser Ser Glu Lys His His Ala Gln Pro Leu Leu Val    |      |     |  |     |  |     |  |
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| ttc ccc gag ggg acc acc acc aat gga agc tgc ctg ctc caa ttc aag    | 583  |     |  |     |  |     |  |
| Phe Pro Glu Gly Thr Thr Thr Asn Gly Ser Cys Leu Leu Gln Phe Lys    |      |     |  |     |  |     |  |
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| acg gga gcc ttt cgt cct ggg gct ccg gtg ctt ccg gtc gtg ctt gag    | 631  |     |  |     |  |     |  |
| Thr Gly Ala Phe Arg Pro Gly Ala Pro Val Leu Pro Val Val Leu Glu    |      |     |  |     |  |     |  |
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| ttt ccg att gac aaa gcg cgt ggt gac ttt tcc ccg gcg tac gaa tcg    | 679  |     |  |     |  |     |  |
| Phe Pro Ile Asp Lys Ala Arg Gly Asp Phe Ser Pro Ala Tyr Glu Ser    |      |     |  |     |  |     |  |
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| Val His Thr Pro Ala His Leu Leu Arg Met Leu Ala Gln Trp Arg His    |      |     |  |     |  |     |  |
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| cgg ctt cgg gtg cgc tat ctt cct ctg tat gag ccc tct gcg gct gag    | 775  |     |  |     |  |     |  |
| Arg Leu Arg Val Arg Tyr Leu Pro Leu Tyr Glu Pro Ser Ala Ala Glu    |      |     |  |     |  |     |  |
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| aag gtt gat gca gac ctt tat gcg cgg aac gtg cgc gac gaa atg gcg    | 823  |     |  |     |  |     |  |
| Lys Val Asp Ala Asp Leu Tyr Ala Arg Asn Val Arg Asp Glu Met Ala    |      |     |  |     |  |     |  |
|  |      | 250 |  | 255 |  | 260 |  |
| cgc gcg ctc aag gta ccc act gtg gag cag tct tac cgc gac aag ctc    | 871  |     |  |     |  |     |  |
| Arg Ala Leu Lys Val Pro Thr Val Glu Gln Ser Tyr Arg Asp Lys Leu    |      |     |  |     |  |     |  |
|  |      | 265 |  | 270 |  | 275 |  |
| gtc tac cac gcg gat ctc atg ccg cac tac cag aag gcc ggc ccc gga    | 919  |     |  |     |  |     |  |
| Val Tyr His Ala Asp Leu Met Pro His Tyr Gln Lys Ala Gly Pro Gly    |      |     |  |     |  |     |  |
|  |      | 280 |  | 285 |  | 290 |  |
| gcg ctc tat ctg tac gtc cga cct gac ctc ttg tagcactcat gcgcgtccca  | 972  |     |  |     |  |     |  |
| Ala Leu Tyr Leu Tyr Val Arg Pro Asp Leu Leu                        |      |     |  |     |  |     |  |
|  |      | 295 |  | 300 |  | 305 |  |
| agcgggtccag caacgggaga ttaaaacacg atttcttagc ctacaaaaaa aaaaaaaaaa | 1032 |     |  |     |  |     |  |
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&lt;213&gt; Thraustochytrium

&lt;400&gt; 2

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Phe Tyr His Ile Glu Val Ser Cys Asp Ala Gln Gly Leu Arg Glu Trp
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Pro Arg Val Ile Val Ala Asn His Val Ser Tyr Leu Glu Ile Leu Tyr
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115     120     125
Ile Val Asp Arg Glu Gly Gly Gly Gln Ser Ala Ser Ala Ile Ile Arg
130     135     140
Asp Arg Val Gln Glu Pro Pro Arg Asp Ser Ser Ser Glu Lys His His
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Ala Gln Pro Leu Leu Val Phe Pro Glu Gly Thr Thr Thr Asn Gly Ser
165     170     175
Cys Leu Leu Gln Phe Lys Thr Gly Ala Phe Arg Pro Gly Ala Pro Val
180     185     190
Leu Pro Val Val Leu Glu Phe Pro Ile Asp Lys Ala Arg Gly Asp Phe
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Ser Pro Ala Tyr Glu Ser Val His Thr Pro Ala His Leu Leu Arg Met
210     215     220
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Glu Pro Ser Ala Ala Glu Lys Val Asp Ala Asp Leu Tyr Ala Arg Asn
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260     265     270
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Gln Lys Ala Gly Pro Gly Ala Leu Tyr Leu Tyr Val Arg Pro Asp Leu
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Leu
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<213> *Physcomitrella patens*

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&lt;221&gt; misc\_feature

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| aggtatgtct  | tattaatgaa  | aatgtctcca | cacatgtatg | ttgtttaggt | atattctgtc  | 120  |
| aactgaaaac  | ttgttttaat  | tttttcttaa | attgaaattc | tgtgcctgaa | agccaactct  | 180  |
| aggtccatca  | taatgtagca  | atatgatcag | aagcgctcaa | atgtgtcgtg | aaagtttgct  | 240  |
| tttgcaattt  | tcttttgctg  | ttaacctatt | gattatgttg | gaaccacaat | acagacgctg  | 300  |
| cttcacttca  | ttcttatggc  | aatgaatgtc | gtgatgattc | cggttaattt | catcctacag  | 360  |
| ggatatggat  | gttgtaaagg  | tgatttttgc | aggtgataaa | gtacctaaag | agaaccgtgt  | 420  |
| gatggtcatg  | tgcaaccatc  | gtaccgaagt | ggactggatg | tacatttgga | acttagcaat  | 480  |
| tcggaaaggc  | aagattgggt  | actgcaagta | tgcggtgaag | aactcagtga | aaaacttacc  | 540  |
| cttgtttgg   | tgggcatttt  | acgtttttga | gtttctgatg | ctgcatagaa | agtgggaagt  | 600  |
| ggatgctccc  | gtcatcaaga  | catacattga | cagttttcaa | gataaaagag | atcctctctg  | 660  |
| gctagtcgtg  | tttctgaag   | gcacagattt | ttcgtaaggc | tgaagtaccc | atccctggct  | 720  |
| ttgatgtata  | tctgcaactc  | tctctataat | ctgcatttat | tctctgttgt | ttctctagca  | 780  |
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| aatgtgattg  | actactatga  | cagtgaagcg | aaacgggaca | cgggcaatgc | aattggaaga  | 900  |
| gagaaaaggct | atccggagct  | tgtcaatgtg | cttcaacctc | gcactcgtgg | ctttgtgact  | 960  |
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| atg | gct | ttg | atg | tat | atc | tgc | aat | ctt | ctc | tat | aat | ctg | cat | tta | ttc | 48  |
| Met | Ala | Leu | Met | Tyr | Ile | Cys | Asn | Leu | Leu | Tyr | Asn | Leu | His | Leu | Phe |     |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |     |
| tct | ggt | ggt | tct | cta | gca | agt | aaa | tca | tac | ttg | ctt | aat | gta | ctt | agc | 96  |
| Ser | Val | Val | Ser | Leu | Ala | Ser | Lys | Ser | Tyr | Leu | Leu | Asn | Val | Leu | Ser |     |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |     |
| aat | ttg | tca | ttt | ttg | act | tat | tgt | gat | gta | aat | gtg | att | gac | tac | tat | 144 |
| Asn | Leu | Ser | Phe | Leu | Thr | Tyr | Cys | Asp | Val | Asn | Val | Ile | Asp | Tyr | Tyr |     |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |
| gac | agt | gaa | gcg | aaa | cgg | gac | acg | ggc | aat | gca | att | gga | aga | gag | aaa | 192 |
| Asp | Ser | Glu | Ala | Lys | Arg | Asp | Thr | Gly | Asn | Ala | Ile | Gly | Arg | Glu | Lys |     |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ggc | tat | ccg | gag | ctt | gtc | aat | gtg | ctt | caa | cct | cgc | act | cgt | ggc | ttt | 240 |
| Gly | Tyr | Pro | Glu | Leu | Val | Asn | Val | Leu | Gln | Pro | Arg | Thr | Arg | Gly | Phe |     |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| gtg | act | tgc | ctt | tct | caa | tcg | cgc | tgc | tct | ttg | gat | gca | gtt | tat | gac | 288 |
| Val | Thr | Cys | Leu | Ser | Gln | Ser | Arg | Cys | Ser | Leu | Asp | Ala | Val | Tyr | Asp |     |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |
| ctc | act | ata | ggg | tac | aag | aag | cgg | tgt | ccc | ttg | ttc | atc | aac | aat | gta | 336 |
| Leu | Thr | Ile | Gly | Tyr | Lys | Lys | Arg | Cys | Pro | Leu | Phe | Ile | Asn | Asn | Val |     |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |     |
| ttc | gga | acc | gat | cca | tcg | gaa | gtg | cac | att | cac | att | cgc | cga | ata | cca | 384 |
| Phe | Gly | Thr | Asp | Pro | Ser | Glu | Val | His | Ile | His | Ile | Arg | Arg | Ile | Pro |     |
|     |     |     | 115 |     |     |     | 120 |     |     |     |     |     | 125 |     |     |     |
| att | tct | gag | att | cct | caa | tca | gaa | gac | ggg | atg | acg | cag | tgg | ctg | tat | 432 |
| Ile | Ser | Glu | Ile | Pro | Gln | Ser | Glu | Asp | Gly | Met | Thr | Gln | Trp | Leu | Tyr |     |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |     |
| gat | cta | ttt | tat | caa | aag | gac | cag | atg | ttg | gcc | agt | ttt | agt | aag | aca | 480 |
| Asp | Leu | Phe | Tyr | Gln | Lys | Asp | Gln | Met | Leu | Ala | Ser | Phe | Ser | Lys | Thr |     |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |     |
| ggc | tct | ttc | cct | gac | agt | gga | att | gaa | gag | agc | cct | ttg | aac | ata | gtg | 528 |
| Gly | Ser | Phe | Pro | Asp | Ser | Gly | Ile | Glu | Glu | Ser | Pro | Leu | Asn | Ile | Val |     |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |     |
| gaa | ggg | gtt | tgc | aat | gtt | gct | cta | cac | gta | gtc | ctt | agc | ggg | tgg | gta | 576 |
| Glu | Gly | Val | Cys | Asn | Val | Ala | Leu | His | Val | Val | Leu | Ser | Gly | Trp | Val |     |
|     |     |     |     | 180 |     |     |     | 185 |     |     |     |     | 190 |     |     |     |
| ttc | tgg | tgc | ttg | ttt | cat | tcg | gtt | tgg | ttg | aag | ctt | tat | gtg | gct | ttc | 624 |
| Phe | Trp | Cys | Leu | Phe | His | Ser | Val | Trp | Leu | Lys | Leu | Tyr | Val | Ala | Phe |     |
|     |     |     | 195 |     |     |     | 200 |     |     |     |     | 205 |     |     |     |     |
| gct | agt | ttg | ctg | ctc | gcg | ttt | agt | acc | tat | ttt | gat | tgg | aga | cct | aaa | 672 |
| Ala | Ser | Leu | Leu | Leu | Ala | Phe | Ser | Thr | Tyr | Phe | Asp | Trp | Arg | Pro | Lys |     |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |     |
| ccg | gtt | tac | tct | agt | cta | cgt | act | aaa | aga | aaa | atc | gtg | taa |     |     | 714 |
| Pro | Val | Tyr | Ser | Ser | Leu | Arg | Thr | Lys | Arg | Lys | Ile | Val |     |     |     |     |
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| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ser | Val | Val | Ser | Leu | Ala | Ser | Lys | Ser | Tyr | Leu | Leu | Asn | Val | Leu | Ser |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Asn | Leu | Ser | Phe | Leu | Thr | Tyr | Cys | Asp | Val | Asn | Val | Ile | Asp | Tyr | Tyr |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Asp | Ser | Glu | Ala | Lys | Arg | Asp | Thr | Gly | Asn | Ala | Ile | Gly | Arg | Glu | Lys |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Gly | Tyr | Pro | Glu | Leu | Val | Asn | Val | Leu | Gln | Pro | Arg | Thr | Arg | Gly | Phe |
| 65  |     |     |     | 70  |     |     |     |     |     | 75  |     |     |     | 80  |     |
| Val | Thr | Cys | Leu | Ser | Gln | Ser | Arg | Cys | Ser | Leu | Asp | Ala | Val | Tyr | Asp |
|     |     |     | 85  |     |     |     |     |     | 90  |     |     |     |     | 95  |     |

Leu Thr Ile Gly Tyr Lys Lys Arg Cys Pro Leu Phe Ile Asn Asn Val  
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 Phe Gly Thr Asp Pro Ser Glu Val His Ile His Ile Arg Arg Ile Pro  
 115 120 125  
 Ile Ser Glu Ile Pro Gln Ser Glu Asp Gly Met Thr Gln Trp Leu Tyr  
 130 135 140  
 Asp Leu Phe Tyr Gln Lys Asp Gln Met Leu Ala Ser Phe Ser Lys Thr  
 145 150 155 160  
 Gly Ser Phe Pro Asp Ser Gly Ile Glu Glu Ser Pro Leu Asn Ile Val  
 165 170 175  
 Glu Gly Val Cys Asn Val Ala Leu His Val Val Leu Ser Gly Trp Val  
 180 185 190  
 Phe Trp Cys Leu Phe His Ser Val Trp Leu Lys Leu Tyr Val Ala Phe  
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<213> *Physcomitrella patens*

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| acaatatgtg  | gtcccacgtc | atgttggtcc | cggagggcac | taccaccaat | ggcagagcaa | 180 |
| taatgcctt   | caaaacagga | gcattttcgc | ctggtctccc | tgtgcagcca | atggttatta | 240 |
| gataccctca  | caagtatgtc | aaccctctt  | ggtgtgacca | aggaggtccg | ttggtcgttg | 300 |
| tggtgcagct  | gatgactcag | ttcatcaacc | acatggaggt | tgaatatttg | ccggtcatga | 360 |
| agccaactgt  | gagagagatg | aaataccctc | atgaattcgc | aagtagagtt | cgcagcgaga | 420 |
| tggctaaagc  | gttaggcac  | gtgtgcacag | aacacagctt | tctggatatt | aagctagcgc | 480 |
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| 1 5 10 15   |     |
| ctc aac ggg ctc gaa acg cca cta ctg gct gaa ttt cct ctt ggc gaa | 96  |
| Leu Asn Gly Leu Glu Thr Pro Leu Leu Ala Glu Phe Pro Leu Gly Glu |     |
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| gat ggt ggt tgg aag acc aac aac gag tgg aat tac ttt caa atg atg | 192 |
| Asp Gly Gly Trp Lys Thr Asn Asn Glu Trp Asn Tyr Phe Gln Met Met |     |
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| aaa tcc att ttg ctg att cca ctt ctt ctc gtt cgt cta gtg agc atg | 240 |
| Lys Ser Ile Leu Leu Ile Pro Leu Leu Leu Val Arg Leu Val Ser Met |     |
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| ata aca atc gta gca ttt gga tat gtg tgg atc agg att tgt ctg atc | 288 |
| Ile Thr Ile Val Ala Phe Gly Tyr Val Trp Ile Arg Ile Cys Leu Ile |     |
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| ggc gtc aca gat ccc ttg ttt aag cct ttc aat ccg tgt cga cgg ttc | 336 |
| Gly Val Thr Asp Pro Leu Phe Lys Pro Phe Asn Pro Cys Arg Arg Phe |     |
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| atg ctg tgg ggc ata cgg tta gta gca aga gca gtg atg ttt acc atg | 384 |
| Met Leu Trp Gly Ile Arg Leu Val Ala Arg Ala Val Met Phe Thr Met |     |
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| ggt tat tac tac att ccc atc aag gga aaa ccg gct cac cga tca gag | 432 |
| Gly Tyr Tyr Tyr Ile Pro Ile Lys Gly Lys Pro Ala His Arg Ser Glu |     |
| 130 135 140   |     |
| gcg ccc att att gtg tcc aat cac att gga ttt ctg gat ccc atc ttt | 480 |
| Ala Pro Ile Ile Val Ser Asn His Ile Gly Phe Leu Asp Pro Ile Phe |     |
| 145 150 155 160   |     |
| gtg ttc tat cgg cac ttg ccg gcc atc gtc tca gcc aag gag aac gtc | 528 |
| Val Phe Tyr Arg His Leu Pro Ala Ile Val Ser Ala Lys Glu Asn Val |     |
| 165 170 175   |     |
| gag atg ccc att att gga ctg ttt ttg caa gct ttg caa ata ata ccc | 576 |
| Glu Met Pro Ile Ile Gly Leu Phe Leu Gln Ala Leu Gln Ile Ile Pro |     |
| 180 185 190   |     |
| gtg gac cgg act gat gct cag tct agg cac cac gcg gct ggc aac gtt | 624 |
| Val Asp Arg Thr Asp Ala Gln Ser Arg His His Ala Ala Gly Asn Val |     |
| 195 200 205   |     |
| cgg cga agg gct gtg gac aat atg tgg tcc cac gtc atg ttg ttc ccg | 672 |
| Arg Arg Arg Ala Val Asp Asn Met Trp Ser His Val Met Leu Phe Pro |     |
| 210 215 220   |     |
| cag ggc act acc acc aat ggc aga gca ata atc gcc ttc aaa aca gga | 720 |
| Gln Gly Thr Thr Thr Asn Gly Arg Ala Ile Ile Ala Phe Lys Thr Gly |     |
| 225 230 235 240   |     |
| gca ttt tcg cct ggt ctc cct gtg cag cca atg gtt att aga tac cct | 768 |
| Ala Phe Ser Pro Gly Leu Pro Val Gln Pro Met Val Ile Arg Tyr Pro |     |
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| cac aag tat gtc aac ccc tct tgg tgt gac caa gga ggt ccg ttg gtc | 816 |
| His Lys Tyr Val Asn Pro Ser Trp Cys Asp Gln Gly Gly Pro Leu Val |     |
| 260 265 270   |     |
| gtt gtg ttg cag ctg atg act cag ttc atc aac cac atg gag gtt gaa | 864 |
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| Tyr Leu Pro Val Met Lys Pro Thr Val Arg Glu Met Lys Tyr Pro His |     |
| 290 295 300   |     |

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 Arg Pro Thr Ile Gly Pro Glu Ala Pro Val Asn Pro Phe His Glu Pro



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |       |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-----|
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| Asp | Gly | Gly | Trp | Lys | Thr | Asn | Asn | Glu | Trp | Asn | Tyr | Phe | Gln | Met   | Met |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |       |     |
| Lys | Ser | Ile | Leu | Leu | Ile | Pro | Leu | Leu | Leu | Val | Arg | Leu | Val | Ser   | Met |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80    |     |
| Ile | Thr | Ile | Val | Ala | Phe | Gly | Tyr | Val | Trp | Ile | Arg | Ile | Cys | Leu   | Ile |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95    |     |
| Gly | Val | Thr | Asp | Pro | Leu | Phe | Lys | Pro | Phe | Asn | Pro | Cys | Arg | Arg   | Phe |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |       |     |
| Met | Leu | Trp | Gly | Ile | Arg | Leu | Val | Ala | Arg | Ala | Val | Met | Phe | Thr   | Met |
|     |     |     | 115 |     |     |     | 120 |     |     |     |     | 125 |     |       |     |
| Gly | Tyr | Tyr | Tyr | Ile | Pro | Ile | Lys | Gly | Lys | Pro | Ala | His | Arg | Ser   | Glu |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |       |     |
| Ala | Pro | Ile | Ile | Val | Ser | Asn | His | Ile | Gly | Phe | Leu | Asp | Pro | Ile   | Phe |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |       | 160 |
| Val | Phe | Tyr | Arg | His | Leu | Pro | Ala | Ile | Val | Ser | Ala | Lys | Glu | Asn   | Val |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175   |     |
| Glu | Met | Pro | Ile | Ile | Gly | Leu | Phe | Leu | Gln | Ala | Leu | Gln | Ile | Ile   | Pro |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |       |     |
| Val | Asp | Arg | Thr | Asp | Ala | Gln | Ser | Arg | His | His | Ala | Ala | Gly | Asn   | Val |
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| Arg | Arg | Arg | Ala | Val | Asp | Asn | Met | Trp | Ser | His | Val | Met | Leu | Phe   | Pro |
|     |     | 210 |     |     |     | 215 |     |     |     |     | 220 |     |     |       |     |
| Gln | Gly | Thr | Thr | Thr | Asn | Gly | Arg | Ala | Ile | Ile | Ala | Phe | Lys | Thr   | Gly |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     | 240   |     |
| Ala | Phe | Ser | Pro | Gly | Leu | Pro | Val | Gln | Pro | Met | Val | Ile | Arg | Tyr   | Pro |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255   |     |
| His | Lys | Tyr | Val | Asn | Pro | Ser | Trp | Cys | Asp | Gln | Gly | Gly | Pro | Leu   | Val |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |       |     |
| Val | Val | Leu | Gln | Leu | Met | Thr | Gln | Phe | Ile | Asn | His | Met | Glu | Val   | Glu |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |       |     |
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|     |     | 290 |     |     |     | 295 |     |     |     |     | 300 |     |     |       |     |
| Glu | Phe | Ala | Ser | Arg | Val | Arg | Ser | Glu | Met | Ala | Lys | Ala | Leu | Gly   | Ile |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320   |     |
| Val | Cys | Thr | Glu | His | Ser | Phe | Leu | Asp | Ile | Lys | Leu | Ala | Leu | Ala   | Ala |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335   |     |
| Glu | Lys | Leu | Lys | Gln | Pro | Ser | Gly | Arg | Ser | Leu | Val | Glu | Phe | Ala   | Arg |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     | 350 |     |       |     |
| Met | Glu | Lys | Leu | Phe | Arg | Leu | Asp | Phe | Pro | Thr | Ala | Lys | Glu | Tyr   | Leu |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |       |     |
| Glu | Lys | Phe | Ser | Ala | Met | Asp | Arg | Thr | His | Ser | Gly | Phe | Val | Thr   | Phe |
|     |     |     |     |     | 375 |     |     |     |     |     | 380 |     |     |       |     |
| Glu | Glu | Leu | Cys | Thr | Ala | Leu | Asp | Leu | Pro | Arg | Ser | Pro | Ile | Thr   | Lys |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     | 400</ |     |

Gln Arg Asn Pro Glu Tyr Leu Ala Ile Ile Ile Tyr Ala His Pro Thr  
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Pro Gln Val Ile Lys Thr Ile Leu Leu Val Pro Leu Leu Val Ile Arg
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Leu Leu Ser Met Phe Ala Leu Met Met Leu Gly Tyr Ile Cys Val Lys
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His Arg Ser Val Ala Pro Ile Ile Val Ser Asn His Ile Gly Phe Val
                                   135      140      145
gat ccc att ttt gtg ttc tat agg cac ttg ccg gtc atc gtc tca gcc      775
Asp Pro Ile Phe Val Phe Tyr Arg His Leu Pro Val Ile Val Ser Ala
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| Lys | Glu | Ile | Val | Glu | Met | Pro | Ile | Ile | Gly | Met | Phe | Leu | Gln | Ala | Leu |      |
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| Gln | Ile | Ile | Pro | Val | Asp | Arg | Ile | Asn | Pro | Ala | Ser | Arg | His | His | Ala |      |
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| gct | gga | aat | atc | cga | cga | aga | gct | atg | gac | aac | gag | tgg | ccg | cat | gtc | 919  |
| Ala | Gly | Asn | Ile | Arg | Arg | Arg | Ala | Met | Asp | Asn | Glu | Trp | Pro | His | Val |      |
|     |     | 200 |     |     |     |     | 205 |     |     |     |     | 210 |     |     |     |      |
| atg | ctg | ttt | cca | gag | ggg | act | acc | aca | aat | ggc | aaa | gcg | ttg | atc | tcc | 967  |
| Met | Leu | Phe | Pro | Glu | Gly | Thr | Thr | Thr | Asn | Gly | Lys | Ala | Leu | Ile | Ser |      |
|     |     | 215 |     |     |     | 220 |     |     |     |     | 225 |     |     |     |     |      |
| ttc | aaa | aca | gga | gca | ttt | tcg | cct | ggg | cta | cct | gtg | caa | ccc | atg | gtc | 1015 |
| Phe | Lys | Thr | Gly | Ala | Phe | Ser | Pro | Gly | Leu | Pro | Val | Gln | Pro | Met | Val |      |
| 230 |     |     |     |     | 235 |     |     |     | 240 |     |     |     |     | 245 |     |      |
| att | aaa | tac | ccc | cac | aag | tat | gtg | aat | ccg | tgt | tgg | tgt | aac | caa | ggg | 1063 |
| Ile | Lys | Tyr | Pro | His | Lys | Tyr | Val | Asn | Pro | Cys | Trp | Cys | Asn | Gln | Gly |      |
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| Gly | Pro | Leu | Val | Ile | Leu | Phe | Gln | Leu | Met | Thr | Gln | Phe | Val | Asn | Tyr |      |
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| Met | Glu | Val | Glu | Tyr | Leu | Pro | Val | Met | Thr | Pro | Asn | Val | His | Glu | Ile |      |
|     |     | 280 |     |     |     | 285 |     |     |     |     | 290 |     |     |     |     |      |
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| Lys | Asn | Pro | His | Glu | Phe | Ala | Asn | Arg | Val | Arg | Thr | Glu | Met | Ala | Lys |      |
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| Ala | Leu | Gly | Val | Val | Cys | Thr | Glu | His | Asn | Phe | Leu | Asp | Ile | Lys | Leu |      |
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| Lys | Met | Ala | Ala | Glu | Lys | Leu | Lys | Gln | Pro | Ser | Gly | Arg | Ser | Leu | Val |      |
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| Glu | Phe | Ala | Arg | Met | Glu | Lys | Leu | Phe | Arg | Leu | Asp | Tyr | Ser | Lys | Ala |      |
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| Gln | Glu | Tyr | Leu | Glu | Lys | Phe | Ser | Ala | Met | Asp | Pro | Ser | His | Ser | Gly |      |
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| Tyr | Val | Thr | Tyr | Asp | Glu | Phe | Leu | Lys | Ala | Leu | His | Leu | Pro | Pro | Thr |      |
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| Gln | Ile | Thr | Glu | Gln | Val | Phe | Asn | Leu | Phe | Asp | Lys | Asn | Gly | His | Gly |      |
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| Ser | Ile | Asn | Phe | Arg | Glu | Phe | Val | Ala | Gly | Leu | Ala | Phe | Leu | Ser | Thr |      |
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| His | Thr | Ser | Phe | Gln | Thr | Thr | Met | Lys | Ala | Ala | Phe | Lys | Ala | Cys | Asp |      |
|     |     |     | 425 |     |     |     | 430 |     |     |     |     | 435 |     |     |     |      |
| gtg | gat | ggc | gat | ggc | acc | ctc | act | cgt | aat | gag | gtg | gaa | agc | agc | ttg | 1639 |
| Val | Asp | Gly | Asp | Gly | Thr | Leu | Thr | Arg | Asn | Glu | Val | Glu | Ser | Ser | Leu |      |
|     |     | 440 |     |     |     | 445 |     |     |     |     |     | 450 |     |     |     |      |
| atg | gcc | gta | ttc | ccg | gag | ctc | ccc | cca | gca | acg | gtg | tta | aaa | ctt | ttc | 1687 |
| Met | Ala | Val | Phe | Pro | Glu | Leu | Pro | Pro | Ala | Thr | Val | Leu | Lys | Leu | Phe |      |
|     |     | 455 |     |     |     | 460 |     |     |     |     | 465 |     |     |     |     |      |
| gac | acg | ctg | gat | tta | aat | cgt | gac | ggg | agc | att | aac | tgg | gag | gag | ttc | 1735 |

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| 490 495 500   |      |
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| Asn Ile   |      |

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<210> 10

<211> 519

<212> PRT

<213> *Physcomitrella patens*

<400> 10

|   |  |
|---|--|
| Met Thr Ser Thr Glu Asn Thr Ala Met Phe Thr Glu Asp Thr Ser Thr |  |
| 1 5 10 15   |  |
| Leu Asn Gly Ser Thr Glu Ala Asn His Ala Glu Phe Pro Leu Gly Glu |  |
| 20 25 30  |  |
| Arg Pro Thr Ile Gly Pro Glu Pro Val Asn Pro Phe His Glu Ser     |  |
| 35 40 45  |  |
| Ser Thr Trp Ser Ile Pro Gln Val Ile Lys Thr Ile Leu Leu Val Pro |  |
| 50 55 60  |  |
| Leu Leu Val Ile Arg Leu Leu Ser Met Phe Ala Leu Met Met Leu Gly |  |
| 65 70 75 80   |  |
| Tyr Ile Cys Val Lys Val Ala Met Ile Gly Cys Lys Asp Pro Leu Phe |  |
| 85 90 95  |  |
| Lys Pro Phe Asn Pro Leu Arg Arg Leu Leu Leu Val Ser Val Arg Leu |  |
| 100 105 110   |  |
| Ile Ala Arg Gly Val Met Val Ala Met Gly Tyr Tyr Tyr Ile Leu Val |  |
| 115 120 125   |  |
| Lys Gly Lys Pro Ala His Arg Ser Val Ala Pro Ile Ile Val Ser Asn |  |
| 130 135 140   |  |
| His Ile Gly Phe Val Asp Pro Ile Phe Val Phe Tyr Arg His Leu Pro |  |
| 145 150 155 160   |  |
| Val Ile Val Ser Ala Lys Glu Ile Val Glu Met Pro Ile Ile Gly Met |  |
| 165 170 175   |  |
| Phe Leu Gln Ala Leu Gln Ile Ile Pro Val Asp Arg Ile Asn Pro Ala |  |
| 180 185 190   |  |
| Ser Arg His His Ala Ala Gly Asn Ile Arg Arg Arg Ala Met Asp Asn |  |
| 195 200 205   |  |
| Glu Trp Pro His Val Met Leu Phe Pro Glu Gly Thr Thr Thr Asn Gly |  |
| 210 215 220   |  |
| Lys Ala Leu Ile Ser Phe Lys Thr Gly Ala Phe Ser Pro Gly Leu Pro |  |
| 225 230 235 240   |  |

Val Gln Pro Met Val Ile Lys Tyr Pro His Lys Tyr Val Asn Pro Cys  
 245 250 255  
 Trp Cys Asn Gln Gly Gly Pro Leu Val Ile Leu Phe Gln Leu Met Thr  
 260 265 270  
 Gln Phe Val Asn Tyr Met Glu Val Glu Tyr Leu Pro Val Met Thr Pro  
 275 280 285  
 Asn Val His Glu Ile Lys Asn Pro His Glu Phe Ala Asn Arg Val Arg  
 290 295 300  
 Thr Glu Met Ala Lys Ala Leu Gly Val Val Cys Thr Glu His Asn Phe  
 305 310 315 320  
 Leu Asp Ile Lys Leu Lys Met Ala Ala Glu Lys Leu Lys Gln Pro Ser  
 325 330 335  
 Gly Arg Ser Leu Val Glu Phe Ala Arg Met Glu Lys Leu Phe Arg Leu  
 340 345 350  
 Asp Tyr Ser Lys Ala Gln Glu Tyr Leu Glu Lys Phe Ser Ala Met Asp  
 355 360 365  
 Pro Ser His Ser Gly Tyr Val Thr Tyr Asp Glu Phe Leu Lys Ala Leu  
 370 375 380  
 His Leu Pro Pro Thr Gln Ile Thr Glu Gln Val Phe Asn Leu Phe Asp  
 385 390 395 400  
 Lys Asn Gly His Gly Ser Ile Asn Phe Arg Glu Phe Val Ala Gly Leu  
 405 410 415  
 Ala Phe Leu Ser Thr His Thr Ser Phe Gln Thr Thr Met Lys Ala Ala  
 420 425 430  
 Phe Lys Ala Cys Asp Val Asp Gly Asp Gly Thr Leu Thr Arg Asn Glu  
 435 440 445  
 Val Glu Ser Ser Leu Met Ala Val Phe Pro Glu Leu Pro Pro Ala Thr  
 450 455 460  
 Val Leu Lys Leu Phe Asp Thr Leu Asp Leu Asn Arg Asp Gly Ser Ile  
 465 470 475 480  
 Asn Trp Glu Glu Phe Ser Ser Phe Leu Gln Arg Asn Pro Glu Tyr Leu  
 485 490 495  
 Ala Ile Ile Leu Ala Ala His Pro Thr Leu Leu Gln Ala Pro Lys Ser  
 500 505 510  
 Glu Glu Ser Glu Thr Asn Ile  
 515

<210> 11

<211> 1014

<212> DNA

<213> *Physcomitrella patens*

<220>

<221> CDS

<222> (1)..(1014)

<223> LPAAT

<400> 11

|   |    |
|---|----|
| atg att atg atg gag gtg ctg tgg tcg gag ctt ata tgg ctg ctg gat | 48 |
| Met Ile Met Met Glu Val Leu Trp Ser Glu Leu Ile Trp Leu Leu Asp |    |
| 1 5 10 15   |    |
| tgg tgg gca aat gtg aag gtg aag gtt tac acg cca aag gag tcg tgg | 96 |
| Trp Trp Ala Asn Val Lys Val Lys Val Tyr Thr Pro Lys Glu Ser Trp |    |
| 20 25 30  |    |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| gag | cac | tta | gga | aag | gag | cac | gca | tta | ctc | att | tgt | aat | cac | cgc | agt | 144  |
| Glu | His | Leu | Gly | Lys | Glu | His | Ala | Leu | Leu | Ile | Cys | Asn | His | Arg | Ser |      |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |      |
| gac | att | gat | tgg | ctc | gta | gga | tgg | att | att | gcc | cag | aga | ttg | ggg | tgt | 192  |
| Asp | Ile | Asp | Trp | Leu | Val | Gly | Trp | Ile | Ile | Ala | Gln | Arg | Leu | Gly | Cys |      |
|     | 50  |     |     |     |     | 55  |     |     |     | 60  |     |     |     |     |     |      |
| cta | ggt | ggg | act | cga | gct | gtt | atg | aag | aag | tcc | acc | aaa | ttt | ctt | ccg | 240  |
| Leu | Gly | Gly | Thr | Arg | Ala | Val | Met | Lys | Lys | Ser | Thr | Lys | Phe | Leu | Pro |      |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |      |
| gtc | att | ggc | tgg | tct | atg | tgg | ttt | tca | gag | tat | gtg | ttt | tta | tca | aga | 288  |
| Val | Ile | Gly | Trp | Ser | Met | Trp | Phe | Ser | Glu | Tyr | Val | Phe | Leu | Ser | Arg |      |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |      |
| gat | tgg | gcc | aaa | gat | gag | aag | gtc | ttg | aag | aat | ggt | tat | tca | agt | ctt | 336  |
| Asp | Trp | Ala | Lys | Asp | Glu | Lys | Val | Leu | Lys | Asn | Gly | Tyr | Ser | Ser | Leu |      |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |      |
| aag | ggc | ttc | ccc | agg | acc | ttg | tgg | gtg | gct | ctt | ttt | gtg | gaa | ggc | act | 384  |
| Lys | Gly | Phe | Pro | Arg | Thr | Leu | Trp | Val | Ala | Leu | Phe | Val | Glu | Gly | Thr |      |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |      |
| cga | ttt | acg | aag | gct | aaa | ctt | gag | gtt | gcc | caa | aaa | ttt | gcg | gcg | gat | 432  |
| Arg | Phe | Thr | Lys | Ala | Lys | Leu | Glu | Val | Ala | Gln | Lys | Phe | Ala | Ala | Asp |      |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |      |
| aca | ggg | cta | cgt | gtt | cca | agg | tat | gtg | ctt | gtt | cct | cgc | aca | aaa | ggg | 480  |
| Thr | Gly | Leu | Arg | Val | Pro | Arg | Tyr | Val | Leu | Val | Pro | Arg | Thr | Lys | Gly |      |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |      |
| ttc | gtt | tcg | gct | gtg | gag | aac | ttg | cgt | gaa | ttt | gtt | ccg | gta | gtt | tat | 528  |
| Phe | Val | Ser | Ala | Val | Glu | Asn | Leu | Arg | Glu | Phe | Val | Pro | Val | Val | Tyr |      |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |      |
| gac | atg | acc | gtt | gct | ata | tct | aaa | gag | ctg | ccc | aat | cct | aca | atg | atc | 576  |
| Asp | Met | Thr | Val | Ala | Ile | Ser | Lys | Glu | Leu | Pro | Asn | Pro | Thr | Met | Ile |      |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |      |
| cgg | att | ttc | aga | ggg | caa | cca | tct | gtg | gtt | cat | gtg | tac | gtg | agg | cgg | 624  |
| Arg | Ile | Phe | Arg | Gly | Gln | Pro | Ser | Val | Val | His | Val | Tyr | Val | Arg | Arg |      |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |      |
| gtc | cct | atg | tct | gat | ctg | cct | gag | gga | gcc | aac | gcg | att | tct | aaa | tgg | 672  |
| Val | Pro | Met | Ser | Asp | Leu | Pro | Glu | Gly | Ala | Asn | Ala | Ile | Ser | Lys | Trp |      |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |
| tgt | cac | gat | gcc | ttt | cac | atc | aag | gac | gat | cgg | ctg | gag | cag | cac | gaa | 720  |
| Cys | His | Asp | Ala | Phe | His | Ile | Lys | Asp | Asp | Arg | Leu | Glu | Gln | His | Glu |      |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |      |
| aaa | gag | aat | acg | ttt | ggg | gag | gac | ttg | tat | att | cct | att | gaa | cgg | cca | 768  |
| Lys | Glu | Asn | Thr | Phe | Gly | Glu | Asp | Leu | Tyr | Ile | Pro | Ile | Glu | Arg | Pro |      |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |      |
| ctt | aaa | cct | ctt | att | att | gtg | atc | tcc | tgg | gcc | atc | act | ttg | ctg | gct | 816  |
| Leu | Lys | Pro | Leu | Ile | Ile | Val | Ile | Ser | Trp | Ala | Ile | Thr | Leu | Leu | Ala |      |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| gca | gca | tgg | tgg | ttt | cta | aga | cga | gtt | tta | tcc | act | tgg | aaa | gga | atc | 864  |
| Ala | Ala | Trp | Trp | Phe | Leu | Arg | Arg | Val | Leu | Ser | Thr | Trp | Lys | Gly | Ile |      |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     |     | 285 |     |     |      |
| gcc | tgg | gtg | gca | gga | gta | ctc | gtg | gtc | gtc | atg | ctg | tgt | gtc | cag | att | 912  |
| Ala | Trp | Val | Ala | Gly | Val | Leu | Val | Val | Val | Met | Leu | Cys | Val | Gln | Ile |      |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |
| tta | gtg | atg | tcg | tca | caa | tcg | gaa | aga | agt | tca | gat | cct | gca | gct | aag | 960  |
| Leu | Val | Met | Ser | Ser | Gln | Ser | Glu | Arg | Ser | Ser | Asp | Pro | Ala | Ala | Lys |      |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |      |
| aag | gcc | aat | caa | aaa | cag | gcg | gct | tct | gtt | gct | cac | ctc | ggc | aaa | acg | 1008 |
| Lys | Ala | Asn | Gln | Lys | Gln | Ala | Ala | Ser | Val | Ala | His | Leu | Gly | Lys | Thr |      |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |      |

gac tga  
Asp

1014

&lt;210&gt; 12

&lt;211&gt; 337

&lt;212&gt; PRT

<213> *Physcomitrella patens*

&lt;400&gt; 12

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Met Ile Met Met Glu Val Leu Trp Ser Glu Leu Ile Trp Leu Leu Asp
1          5          10          15
Trp Trp Ala Asn Val Lys Val Lys Val Tyr Thr Pro Lys Glu Ser Trp
          20          25          30
Glu His Leu Gly Lys Glu His Ala Leu Leu Ile Cys Asn His Arg Ser
          35          40          45
Asp Ile Asp Trp Leu Val Gly Trp Ile Ile Ala Gln Arg Leu Gly Cys
          50          55          60
Leu Gly Gly Thr Arg Ala Val Met Lys Lys Ser Thr Lys Phe Leu Pro
65          70          75          80
Val Ile Gly Trp Ser Met Trp Phe Ser Glu Tyr Val Phe Leu Ser Arg
          85          90          95
Asp Trp Ala Lys Asp Glu Lys Val Leu Lys Asn Gly Tyr Ser Ser Leu
          100          105          110
Lys Gly Phe Pro Arg Thr Leu Trp Val Ala Leu Phe Val Glu Gly Thr
          115          120          125
Arg Phe Thr Lys Ala Lys Leu Glu Val Ala Gln Lys Phe Ala Ala Asp
          130          135          140
Thr Gly Leu Arg Val Pro Arg Tyr Val Leu Val Pro Arg Thr Lys Gly
145          150          155          160
Phe Val Ser Ala Val Glu Asn Leu Arg Glu Phe Val Pro Val Val Tyr
          165          170          175
Asp Met Thr Val Ala Ile Ser Lys Glu Leu Pro Asn Pro Thr Met Ile
          180          185          190
Arg Ile Phe Arg Gly Gln Pro Ser Val Val His Val Tyr Val Arg Arg
          195          200          205
Val Pro Met Ser Asp Leu Pro Glu Gly Ala Asn Ala Ile Ser Lys Trp
          210          215          220
Cys His Asp Ala Phe His Ile Lys Asp Asp Arg Leu Glu Gln His Glu
225          230          235          240
Lys Glu Asn Thr Phe Gly Glu Asp Leu Tyr Ile Pro Ile Glu Arg Pro
          245          250          255
Leu Lys Pro Leu Ile Ile Val Ile Ser Trp Ala Ile Thr Leu Leu Ala
          260          265          270
Ala Ala Trp Trp Phe Leu Arg Arg Val Leu Ser Thr Trp Lys Gly Ile
          275          280          285
Ala Trp Val Ala Gly Val Leu Val Val Val Met Leu Cys Val Gln Ile
          290          295          300
Leu Val Met Ser Ser Gln Ser Glu Arg Ser Ser Asp Pro Ala Ala Lys
305          310          315          320
Lys Ala Asn Gln Lys Gln Ala Ala Ser Val Ala His Leu Gly Lys Thr
          325          330          335
Asp

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<210> 13  
<211> 643

<212> DNA  
<213> *Physcomitrella patens*

<220>  
<221> misc\_feature  
<223> LPAAT2

<400> 13

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ggcgcgccag aggcagagac aaggggagtc aattggaatg cctgaagacc tgcataaaac    60
tggttaaaga aggtgtgtct gctctgtttt tccctgaggg cacaaggaca acggatggag    120
caatggctgc cttcaagaaa ggagctttct ctgtggcggc caagggaggt gtgtcagttg    180
tacctataac gttaattggc tcaggcaagt tgatgccaaa tggtttagaa tatacattac    240
ggcctggcgt tgtgaaaatg attgtccacc cagctatccg cagtaaaaat gccgatgagc    300
tttgtgatca gtctaggaag gttattgcag agaccttgat caaacacggt cttcctgttc    360
attagtgtct gtgattgatg atcgccctatc aggatgatgc gatcaagtga tcaagccctg    420
tttgtcgctt ttagtgatta aggagtcatt tctgtccatc gtttatgccc cgcaagagat    480
ttaaggagat cacaaagtcg gttgtagcaa gagagttgga cactgtgata agcccaatta    540
acttatgttg aagtgtcatt tattctttga aaaaaaaaaa aataaaaaaa aaaaaaaaaa    600
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaagcggc cgc                                643

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<210> 14

<211> 657  
<212> DNA  
<213> *Physcomitrella patens*

<220>  
<221> CDS  
<222> (1)..(657)  
<223> LPAAT

<400> 14

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atg ctg ata tta cag ccc ttc gta ctc tta ctc gac aag caa cgt aga    48
Met Leu Ile Leu Gln Pro Phe Val Leu Leu Leu Asp Lys Gln Arg Arg
1          5          10          15
aga gct cag cac ctt gtg aac aag gtg tgg gca att ttg aca acg tct    96
Arg Ala Gln His Leu Val Asn Lys Val Trp Ala Ile Leu Thr Thr Ser
          20          25          30
ttg ttt tat aaa act gag att gaa ggt tgg gaa aat ctt cca gca tct    144
Leu Phe Tyr Lys Thr Glu Ile Glu Gly Trp Glu Asn Leu Pro Ala Ser
          35          40          45
gat gag ggt gca gtg tat gtt gcc aat cat caa agc ttt ttg gac atc    192
Asp Glu Gly Ala Val Tyr Val Ala Asn His Gln Ser Phe Leu Asp Ile
          50          55          60
tat aca ctc ttt caa tta gga cga cca ttt aag ttt att agc aag acc    240
Tyr Thr Leu Phe Gln Leu Gly Arg Pro Phe Lys Phe Ile Ser Lys Thr
65          70          75          80
agc aat ttt ctc att ccg att att ggt tgg tcc atg tac atg acg ggc    288
Ser Asn Phe Leu Ile Pro Ile Ile Gly Trp Ser Met Tyr Met Thr Gly
          85          90          95
cac att ccc cta aag cgt atg gac aag agg agt caa ttg gaa tgc ctg    336
His Ile Pro Leu Lys Arg Met Asp Lys Arg Ser Gln Leu Glu Cys Leu

```



|   |     |  |     |  |     |     |
|---|-----|--|-----|--|-----|-----|
|   | 100 |  | 105 |  | 110 |     |
| aag acc tgc atg aag ctg gtt aaa gaa ggt gtg tct gtt ctg ttt ttc |     |  |     |  |     | 384 |
| Lys Thr Cys Met Lys Leu Val Lys Glu Gly Val Ser Val Leu Phe Phe |     |  |     |  |     |     |
|   | 115 |  | 120 |  | 125 |     |
| cct gag ggc aca agg aca acg gat gga gca atg gct gcc ttc aag aaa |     |  |     |  |     | 432 |
| Pro Glu Gly Thr Arg Thr Thr Asp Gly Ala Met Ala Ala Phe Lys Lys |     |  |     |  |     |     |
|   | 130 |  | 135 |  | 140 |     |
| gga gct ttc tct gtg gcg gcc aag gga ggt gtg cca gtt gta cct ata |     |  |     |  |     | 480 |
| Gly Ala Phe Ser Val Ala Ala Lys Gly Gly Val Pro Val Val Pro Ile |     |  |     |  |     |     |
|   | 145 |  | 150 |  | 155 | 160 |
| acg tta att ggc tca ggc aag ttg atg cca aat ggt tta gaa tat aca |     |  |     |  |     | 528 |
| Thr Leu Ile Gly Ser Gly Lys Leu Met Pro Asn Gly Leu Glu Tyr Thr |     |  |     |  |     |     |
|   | 165 |  | 170 |  | 175 |     |
| tta cgg cct ggc gtt gtg aaa atg att gtc cac cca gct atc cgc agt |     |  |     |  |     | 576 |
| Leu Arg Pro Gly Val Val Lys Met Ile Val His Pro Ala Ile Arg Ser |     |  |     |  |     |     |
|   | 180 |  | 185 |  | 190 |     |
| aaa aat gcc gat gag ctt tgt gat cag tct agg aag gtt att gca gag |     |  |     |  |     | 624 |
| Lys Asn Ala Asp Glu Leu Cys Asp Gln Ser Arg Lys Val Ile Ala Glu |     |  |     |  |     |     |
|   | 195 |  | 200 |  | 205 |     |
| acc ttg atc caa cac ggt ctt cct gtt cat tag                     |     |  |     |  |     | 657 |
| Thr Leu Ile Gln His Gly Leu Pro Val His                         |     |  |     |  |     |     |
|   | 210 |  | 215 |  |     |     |

&lt;210&gt; 15

&lt;211&gt; 218

&lt;212&gt; PRT

&lt;213&gt; Physcomitrella patens

&lt;400&gt; 15

|   |  |
|---|--|
| Met Leu Ile Leu Gln Pro Phe Val Leu Leu Leu Asp Lys Gln Arg Arg |  |
| 1 5 10 15   |  |
| Arg Ala Gln His Leu Val Asn Lys Val Trp Ala Ile Leu Thr Thr Ser |  |
| 20 25 30  |  |
| Leu Phe Tyr Lys Thr Glu Ile Glu Gly Trp Glu Asn Leu Pro Ala Ser |  |
| 35 40 45  |  |
| Asp Glu Gly Ala Val Tyr Val Ala Asn His Gln Ser Phe Leu Asp Ile |  |
| 50 55 60  |  |
| Tyr Thr Leu Phe Gln Leu Gly Arg Pro Phe Lys Phe Ile Ser Lys Thr |  |
| 65 70 75 80   |  |
| Ser Asn Phe Leu Ile Pro Ile Ile Gly Trp Ser Met Tyr Met Thr Gly |  |
| 85 90 95  |  |
| His Ile Pro Leu Lys Arg Met Asp Lys Arg Ser Gln Leu Glu Cys Leu |  |
| 100 105 110   |  |
| Lys Thr Cys Met Lys Leu Val Lys Glu Gly Val Ser Val Leu Phe Phe |  |
| 115 120 125   |  |
| Pro Glu Gly Thr Arg Thr Thr Asp Gly Ala Met Ala Ala Phe Lys Lys |  |
| 130 135 140   |  |
| Gly Ala Phe Ser Val Ala Ala Lys Gly Gly Val Pro Val Val Pro Ile |  |
| 145 150 155 160   |  |
| Thr Leu Ile Gly Ser Gly Lys Leu Met Pro Asn Gly Leu Glu Tyr Thr |  |
| 165 170 175   |  |
| Leu Arg Pro Gly Val Val Lys Met Ile Val His Pro Ala Ile Arg Ser |  |
| 180 185 190   |  |
| Lys Asn Ala Asp Glu Leu Cys Asp Gln Ser Arg Lys Val Ile Ala Glu |  |
| 195 200 205   |  |

Thr Leu Ile Gln His Gly Leu Pro Val His  
210 215

<210> 16

<211> 1254

<212> DNA

<213> *Mortierella alpina*

<220>

<221> CDS

<222> (1)..(1251)

<223> LPAAT

<400> 16

|   |     |
|---|-----|
| atg gat gaa tcc acc acg acc acc acg cac cac tca gag acc agc agc | 48  |
| Met Asp Glu Ser Thr Thr Thr Thr Thr His His Ser Glu Thr Ser Ser |     |
| 1 5 10 15   |     |
| aag acg tcc tcg cac ccc cgc cgg ctc ggt ccc gag atg aac cct atc | 96  |
| Lys Thr Ser Ser His Pro Arg Arg Leu Gly Pro Glu Met Asn Pro Ile |     |
| 20 25 30  |     |
| tac aag ggt ctg cga gcc att gtc tgg gcc ttt tac ttc aac ctg gga | 144 |
| Tyr Lys Gly Leu Arg Ala Ile Val Trp Ala Phe Tyr Phe Asn Leu Gly |     |
| 35 40 45  |     |
| gcg tcg ctt ata tcg atc acg cag gtg ctg tcg ctg cct ctg gcg ttg | 192 |
| Ala Ser Leu Ile Ser Ile Thr Gln Val Leu Ser Leu Pro Leu Ala Leu |     |
| 50 55 60  |     |
| att gct cca ggg gtc tac cag tgg cac atc agc aaa aca cag ggt cac | 240 |
| Ile Ala Pro Gly Val Tyr Gln Trp His Ile Ser Lys Thr Gln Gly His |     |
| 65 70 75 80   |     |
| ttt gga gct ttc ctg ctc cgg atg aac cag ctc ttt gcg ccg tca gat | 288 |
| Phe Gly Ala Phe Leu Leu Arg Met Asn Gln Leu Phe Ala Pro Ser Asp |     |
| 85 90 95  |     |
| att gtc ttg aca ggg gac gag agt gtc agg gga atc gtc aag gtc tac | 336 |
| Ile Val Leu Thr Gly Asp Glu Ser Val Arg Gly Ile Val Lys Val Tyr |     |
| 100 105 110   |     |
| aaa gga cgg aac ctg aag gag gcc ggt gag cca ggc agc ggt cag gga | 384 |
| Lys Gly Arg Asn Leu Lys Glu Ala Gly Glu Pro Gly Ser Gly Gln Gly |     |
| 115 120 125   |     |
| gag gac att ctt ctg gat atg ccc gag agg atg gtt ttc att gcg aac | 432 |
| Glu Asp Ile Leu Leu Asp Met Pro Glu Arg Met Val Phe Ile Ala Asn |     |
| 130 135 140   |     |
| cac cag atc tac tct gac tgg atg tac ctc tgg tgc ttc tcc tat ttt | 480 |
| His Gln Ile Tyr Ser Asp Trp Met Tyr Leu Trp Cys Phe Ser Tyr Phe |     |
| 145 150 155 160   |     |
| gca gag agg cac agg gca ctg aag att att ctt cgg ggc gac ctg acc | 528 |
| Ala Glu Arg His Arg Ala Leu Lys Ile Ile Leu Arg Gly Asp Leu Thr |     |
| 165 170 175   |     |
| tgg atc cct gtc ttt ggc tgg ggt atg cgg ttc ttt gac ttt atc ttt | 576 |
| Trp Ile Pro Val Phe Gly Trp Gly Met Arg Phe Phe Asp Phe Ile Phe |     |
| 180 185 190   |     |
| ttg aaa cgt aat gac tgg gca cac gat cgc cgt gcc att gag gaa aac | 624 |
| Leu Lys Arg Asn Asp Trp Ala His Asp Arg Arg Ala Ile Glu Glu Asn |     |
| 195 200 205   |     |
| ttg gga cgt gtc aag gaa aag gat ccc ctc tgg ctc gtg gtc ttc ccc | 672 |
| Leu Gly Arg Val Lys Glu Lys Asp Pro Leu Trp Leu Val Val Phe Pro |     |

|   |     |     |      |
|---|-----|-----|------|
| 210   | 215 | 220 |      |
| gag gga aca gtc gtc tcc aag gaa acg cgt ctc cga tcc gtt gcc ttt |     |     | 720  |
| Glu Gly Thr Val Val Ser Lys Glu Thr Arg Leu Arg Ser Val Ala Phe |     |     |      |
| 225   | 230 | 235 | 240  |
| tca aag aag gct agt ctg tcg gat cac cgc cat gtg ctg ctt cca agg |     |     | 768  |
| Ser Lys Lys Ala Ser Leu Ser Asp His Arg His Val Leu Leu Pro Arg |     |     |      |
| 245   | 250 | 255 |      |
| acc agc ggt ctg ttt gtg tgc atc aac aag ttg cgt gga tct gtc gac |     |     | 816  |
| Thr Ser Gly Leu Phe Val Cys Ile Asn Lys Leu Arg Gly Ser Val Asp |     |     |      |
| 260   | 265 | 270 |      |
| tac ttg tac gat gca acc gtt ggc tac tcg aat gtc gag tat ggc gag |     |     | 864  |
| Tyr Leu Tyr Asp Ala Thr Val Gly Tyr Ser Asn Val Glu Tyr Gly Glu |     |     |      |
| 275   | 280 | 285 |      |
| att ccg cag gag ctt tac ccg tta cca gga ctg tat atc aac aaa gca |     |     | 912  |
| Ile Pro Gln Glu Leu Tyr Pro Leu Pro Gly Leu Tyr Ile Asn Lys Ala |     |     |      |
| 290   | 295 | 300 |      |
| cag ccc aag gag atc aac atg cac ctg cgt cga ttt gcg atc aag gat |     |     | 960  |
| Gln Pro Lys Glu Ile Asn Met His Leu Arg Arg Phe Ala Ile Lys Asp |     |     |      |
| 305   | 310 | 315 | 320  |
| atc ccc acg tca gaa ccc gaa ttt gtg gaa tgg gtc cga gct cgg tgg |     |     | 1008 |
| Ile Pro Thr Ser Glu Pro Glu Phe Val Glu Trp Val Arg Ala Arg Trp |     |     |      |
| 325   | 330 | 335 |      |
| gtg gag aag gat gag ttg atg gaa gag ttt tat acc aag ggc cga ttt |     |     | 1056 |
| Val Glu Lys Asp Glu Leu Met Glu Glu Phe Tyr Thr Lys Gly Arg Phe |     |     |      |
| 340   | 345 | 350 |      |
| cca tca caa ctg acg gcc gcc gac att ggt gag aag gag gtc aag acg |     |     | 1104 |
| Pro Ser Gln Leu Thr Ala Ala Asp Ile Gly Glu Lys Glu Val Lys Thr |     |     |      |
| 355   | 360 | 365 |      |
| gca gga ggt cca acg gag gga cag agt gtc agg atc ccg ctc aag gcg |     |     | 1152 |
| Ala Gly Gly Pro Thr Glu Gly Gln Ser Val Arg Ile Pro Leu Lys Ala |     |     |      |
| 370   | 375 | 380 |      |
| cga ggc atg atg gac tac ctc atg ccc tcg gtc atg aat ctg atc gcc |     |     | 1200 |
| Arg Gly Met Met Asp Tyr Leu Met Pro Ser Val Met Asn Leu Ile Ala |     |     |      |
| 385   | 390 | 395 | 400  |
| ctt cct gtg ctg gcg ttt gcg atg aga tat gca gtg cag caa gca tcg |     |     | 1248 |
| Leu Pro Val Leu Ala Phe Ala Met Arg Tyr Ala Val Gln Gln Ala Ser |     |     |      |
| 405   | 410 | 415 |      |
| ggc tga   |     |     | 1254 |
| Gly   |     |     |      |

&lt;210&gt; 17

&lt;211&gt; 417

&lt;212&gt; PRT

&lt;213&gt; Mortierella alpina

&lt;400&gt; 17

|   |  |
|---|--|
| Met Asp Glu Ser Thr Thr Thr Thr Thr His His Ser Glu Thr Ser Ser |  |
| 1 5 10 15   |  |
| Lys Thr Ser Ser His Pro Arg Arg Leu Gly Pro Glu Met Asn Pro Ile |  |
| 20 25 30  |  |
| Tyr Lys Gly Leu Arg Ala Ile Val Trp Ala Phe Tyr Phe Asn Leu Gly |  |
| 35 40 45  |  |
| Ala Ser Leu Ile Ser Ile Thr Gln Val Leu Ser Leu Pro Leu Ala Leu |  |
| 50 55 60  |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Ala | Pro | Gly | Val | Tyr | Gln | Trp | His | Ile | Ser | Lys | Thr | Gln | Gly | His |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Phe | Gly | Ala | Phe | Leu | Leu | Arg | Met | Asn | Gln | Leu | Phe | Ala | Pro | Ser | Asp |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Ile | Val | Leu | Thr | Gly | Asp | Glu | Ser | Val | Arg | Gly | Ile | Val | Lys | Val | Tyr |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Lys | Gly | Arg | Asn | Leu | Lys | Glu | Ala | Gly | Glu | Pro | Gly | Ser | Gly | Gln | Gly |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Glu | Asp | Ile | Leu | Leu | Asp | Met | Pro | Glu | Arg | Met | Val | Phe | Ile | Ala | Asn |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| His | Gln | Ile | Tyr | Ser | Asp | Trp | Met | Tyr | Leu | Trp | Cys | Phe | Ser | Tyr | Phe |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Ala | Glu | Arg | His | Arg | Ala | Leu | Lys | Ile | Ile | Leu | Arg | Gly | Asp | Leu | Thr |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Trp | Ile | Pro | Val | Phe | Gly | Trp | Gly | Met | Arg | Phe | Phe | Asp | Phe | Ile | Phe |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Leu | Lys | Arg | Asn | Asp | Trp | Ala | His | Asp | Arg | Arg | Ala | Ile | Glu | Glu | Asn |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Leu | Gly | Arg | Val | Lys | Glu | Lys | Asp | Pro | Leu | Trp | Leu | Val | Val | Phe | Pro |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Glu | Gly | Thr | Val | Val | Ser | Lys | Glu | Thr | Arg | Leu | Arg | Ser | Val | Ala | Phe |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Ser | Lys | Lys | Ala | Ser | Leu | Ser | Asp | His | Arg | His | Val | Leu | Leu | Pro | Arg |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Thr | Ser | Gly | Leu | Phe | Val | Cys | Ile | Asn | Lys | Leu | Arg | Gly | Ser | Val | Asp |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Tyr | Leu | Tyr | Asp | Ala | Thr | Val | Gly | Tyr | Ser | Asn | Val | Glu | Tyr | Gly | Glu |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Ile | Pro | Gln | Glu | Leu | Tyr | Pro | Leu | Pro | Gly | Leu | Tyr | Ile | Asn | Lys | Ala |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Gln | Pro | Lys | Glu | Ile | Asn | Met | His | Leu | Arg | Arg | Phe | Ala | Ile | Lys | Asp |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Ile | Pro | Thr | Ser | Glu | Pro | Glu | Phe | Val | Glu | Trp | Val | Arg | Ala | Arg | Trp |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Val | Glu | Lys | Asp | Glu | Leu | Met | Glu | Glu | Phe | Tyr | Thr | Lys | Gly | Arg | Phe |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Pro | Ser | Gln | Leu | Thr | Ala | Ala | Asp | Ile | Gly | Glu | Lys | Glu | Val | Lys | Thr |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Ala | Gly | Gly | Pro | Thr | Glu | Gly | Gln | Ser | Val | Arg | Ile | Pro | Leu | Lys | Ala |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Arg | Gly | Met | Met | Asp | Tyr | Leu | Met | Pro | Ser | Val | Met | Asn | Leu | Ile | Ala |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Leu | Pro | Val | Leu | Ala | Phe | Ala | Met | Arg | Tyr | Ala | Val | Gln | Gln | Ala | Ser |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |

Gly

&lt;210&gt; 18

&lt;211&gt; 1170

&lt;212&gt; DNA

&lt;213&gt; Mortierella alpina

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(1167)

&lt;223&gt; LPAAT

&lt;400&gt; 18

|   |     |
|---|-----|
| atg aac cct atc tac aag ggt ctg cga gcc att gtc tgg gcc ttt tac | 48  |
| Met Asn Pro Ile Tyr Lys Gly Leu Arg Ala Ile Val Trp Ala Phe Tyr |     |
| 1 5 10 15   |     |
| ttc aac ctg gga gcg tcg ctt ata tcg atc acg cag gtg ctg tcg ctg | 96  |
| Phe Asn Leu Gly Ala Ser Leu Ile Ser Ile Thr Gln Val Leu Ser Leu |     |
| 20 25 30  |     |
| cct ctg gcg ttg att gct cca ggg gtc tac cag tgg cac atc agc aaa | 144 |
| Pro Leu Ala Leu Ile Ala Pro Gly Val Tyr Gln Trp His Ile Ser Lys |     |
| 35 40 45  |     |
| aca cag ggt cac ttt gga gct ttc ctg ctc cgg atg aac cag ctc ttt | 192 |
| Thr Gln Gly His Phe Gly Ala Phe Leu Leu Arg Met Asn Gln Leu Phe |     |
| 50 55 60  |     |
| gcg ccg tca gat att gtc ttg aca ggg gac gag agt gtc agg gga atc | 240 |
| Ala Pro Ser Asp Ile Val Leu Thr Gly Asp Glu Ser Val Arg Gly Ile |     |
| 65 70 75 80   |     |
| gtc aag gtc tac aaa gga cgg aac ctg aag gag gcc ggt gag cca ggc | 288 |
| Val Lys Val Tyr Lys Gly Arg Asn Leu Lys Glu Ala Gly Glu Pro Gly |     |
| 85 90 95  |     |
| agc ggt cag gga gag gac att ctt ctg gat atg ccc gag agg atg gtt | 336 |
| Ser Gly Gln Gly Glu Asp Ile Leu Leu Asp Met Pro Glu Arg Met Val |     |
| 100 105 110   |     |
| ttc att gcg aac cac cag atc tac tct gac tgg atg tac ctc tgg tgc | 384 |
| Phe Ile Ala Asn His Gln Ile Tyr Ser Asp Trp Met Tyr Leu Trp Cys |     |
| 115 120 125   |     |
| ttc tcc tat ttt gca gag agg cac agg gca ctg aag att att ctt cgg | 432 |
| Phe Ser Tyr Phe Ala Glu Arg His Arg Ala Leu Lys Ile Ile Leu Arg |     |
| 130 135 140   |     |
| ggc gac ctg acc tgg atc cct gtc ttt ggc tgg ggt atg cgg ttc ttt | 480 |
| Gly Asp Leu Thr Trp Ile Pro Val Phe Gly Trp Gly Met Arg Phe Phe |     |
| 145 150 155 160   |     |
| gac ttt atc ttt ttg aaa cgt aat gac tgg gca cac gat cgc cgt gcc | 528 |
| Asp Phe Ile Phe Leu Lys Arg Asn Asp Trp Ala His Asp Arg Arg Ala |     |
| 165 170 175   |     |
| att gag gaa aac ttg gga cgt gtc aag gaa aag gat ccc ctc tgg ctc | 576 |
| Ile Glu Glu Asn Leu Gly Arg Val Lys Glu Lys Asp Pro Leu Trp Leu |     |
| 180 185 190   |     |
| gtg gtc ttc ccc gag gga aca gtc gtc tcc aag gaa acg cgt ctc cga | 624 |
| Val Val Phe Pro Glu Gly Thr Val Val Ser Lys Glu Thr Arg Leu Arg |     |
| 195 200 205   |     |
| tcc gtt gcc ttt tca aag aag gct agt ctg tcg gat cac cgc cat gtg | 672 |
| Ser Val Ala Phe Ser Lys Lys Ala Ser Leu Ser Asp His Arg His Val |     |
| 210 215 220   |     |
| ctg ctt cca agg acc agc ggt ctg ttt gtg tgc atc aac aag ttg cgt | 720 |
| Leu Leu Pro Arg Thr Ser Gly Leu Phe Val Cys Ile Asn Lys Leu Arg |     |
| 225 230 235 240   |     |
| gga tct gtc gac tac ttg tac gat gca acc gtt ggc tac tcg aat gtc | 768 |
| Gly Ser Val Asp Tyr Leu Tyr Asp Ala Thr Val Gly Tyr Ser Asn Val |     |
| 245 250 255   |     |
| gag tat ggc gag att ccg cag gag ctt tac ccg tta cca gga ctg tat | 816 |
| Glu Tyr Gly Glu Ile Pro Gln Glu Leu Tyr Pro Leu Pro Gly Leu Tyr |     |
| 260 265 270   |     |
| atc aac aaa gca cag ccg aag gag atc aac atg cac ctg cgt cga ttt | 864 |
| Ile Asn Lys Ala Gln Pro Lys Glu Ile Asn Met His Leu Arg Arg Phe |     |
| 275 280 285   |     |
| gcg atc aag gat atc ccc acg tca gaa ccc gaa ttt gtg gaa tgg gtc | 912 |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| Ala | Ile | Lys | Asp | Ile | Pro | Thr | Ser | Glu | Pro | Glu | Phe | Val | Glu | Trp | Val |      |  |
| 290 |     |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |  |
| cga | gct | cgg | tgg | gtg | gag | aag | gat | gag | ttg | atg | gaa | gag | ttt | tat | acc | 960  |  |
| Arg | Ala | Arg | Trp | Val | Glu | Lys | Asp | Glu | Leu | Met | Glu | Glu | Phe | Tyr | Thr |      |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |      |  |
| aag | ggc | cga | ttt | cca | tca | caa | ctg | acg | gcc | gcc | gac | att | ggg | gag | aag | 1008 |  |
| Lys | Gly | Arg | Phe | Pro | Ser | Gln | Leu | Thr | Ala | Ala | Asp | Ile | Gly | Glu | Lys |      |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |      |  |
| gag | gtc | aag | acg | gca | gga | ggg | cca | acg | gag | gga | cag | agt | gtc | agg | atc | 1056 |  |
| Glu | Val | Lys | Thr | Ala | Gly | Gly | Pro | Thr | Glu | Gly | Gln | Ser | Val | Arg | Ile |      |  |
|     |     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |      |  |
| ccg | ctc | aag | gcg | cga | ggc | atg | atg | gac | tac | ctc | atg | ccc | tcg | gtc | atg | 1104 |  |
| Pro | Leu | Lys | Ala | Arg | Gly | Met | Met | Asp | Tyr | Leu | Met | Pro | Ser | Val | Met |      |  |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |      |  |
| aat | ctg | atc | gcc | ctt | cct | gtg | ctg | gcg | ttt | gcg | atg | aga | tat | gca | gtg | 1152 |  |
| Asn | Leu | Ile | Ala | Leu | Pro | Val | Leu | Ala | Phe | Ala | Met | Arg | Tyr | Ala | Val |      |  |
|     |     | 370 |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |      |  |
| cag | caa | gca | tcg | ggc | tga |     |     |     |     |     |     |     |     |     |     | 1170 |  |
| Gln | Gln | Ala | Ser | Gly |     |     |     |     |     |     |     |     |     |     |     |      |  |
| 385 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |  |

&lt;210&gt; 19

&lt;211&gt; 389

&lt;212&gt; PRT

&lt;213&gt; Mortierella alpina

&lt;400&gt; 19

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Met | Asn | Pro | Ile | Tyr | Lys | Gly | Leu | Arg | Ala | Ile | Val | Trp | Ala | Phe | Tyr |  |  |
| 1   |     |     | 5   |     |     |     |     |     | 10  |     |     |     |     | 15  |     |  |  |
| Phe | Asn | Leu | Gly | Ala | Ser | Leu | Ile | Ser | Ile | Thr | Gln | Val | Leu | Ser | Leu |  |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |  |
| Pro | Leu | Ala | Leu | Ile | Ala | Pro | Gly | Val | Tyr | Gln | Trp | His | Ile | Ser | Lys |  |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |  |  |
| Thr | Gln | Gly | His | Phe | Gly | Ala | Phe | Leu | Leu | Arg | Met | Asn | Gln | Leu | Phe |  |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |  |
| Ala | Pro | Ser | Asp | Ile | Val | Leu | Thr | Gly | Asp | Glu | Ser | Val | Arg | Gly | Ile |  |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |  |
| Val | Lys | Val | Tyr | Lys | Gly | Arg | Asn | Leu | Lys | Glu | Ala | Gly | Glu | Pro | Gly |  |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |  |
| Ser | Gly | Gln | Gly | Glu | Asp | Ile | Leu | Leu | Asp | Met | Pro | Glu | Arg | Met | Val |  |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |  |
| Phe | Ile | Ala | Asn | His | Gln | Ile | Tyr | Ser | Asp | Trp | Met | Tyr | Leu | Trp | Cys |  |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |  |
| Phe | Ser | Tyr | Phe | Ala | Glu | Arg | His | Arg | Ala | Leu | Lys | Ile | Ile | Leu | Arg |  |  |
|     | 130 |     |     |     |     |     | 135 |     |     |     | 140 |     |     |     |     |  |  |
| Gly | Asp | Leu | Thr | Trp | Ile | Pro | Val | Phe | Gly | Trp | Gly | Met | Arg | Phe | Phe |  |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |  |
| Asp | Phe | Ile | Phe | Leu | Lys | Arg | Asn | Asp | Trp | Ala | His | Asp | Arg | Arg | Ala |  |  |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |  |  |
| Ile | Glu | Glu | Asn | Leu | Gly | Arg | Val | Lys | Glu | Lys | Asp | Pro | Leu | Trp | Leu |  |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |  |
| Val | Val | Phe | Pro | Glu | Gly | Thr | Val | Val | Ser | Lys | Glu | Thr | Arg | Leu | Arg |  |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |  |
| Ser | Val | Ala | Phe | Ser | Lys | Lys | Ala | Ser | Leu | Ser | Asp | His | Arg | His | Val |  |  |
|     | 210 |     |     |     |     |     | 215 |     |     |     | 220 |     |     |     |     |  |  |

Leu Leu Pro Arg Thr Ser Gly Leu Phe Val Cys Ile Asn Lys Leu Arg  
 225 230 235 240  
 Gly Ser Val Asp Tyr Leu Tyr Asp Ala Thr Val Gly Tyr Ser Asn Val  
 245 250 255  
 Glu Tyr Gly Glu Ile Pro Gln Glu Leu Tyr Pro Leu Pro Gly Leu Tyr  
 260 265 270  
 Ile Asn Lys Ala Gln Pro Lys Glu Ile Asn Met His Leu Arg Arg Phe  
 275 280 285  
 Ala Ile Lys Asp Ile Pro Thr Ser Glu Pro Glu Phe Val Glu Trp Val  
 290 295 300  
 Arg Ala Arg Trp Val Glu Lys Asp Glu Leu Met Glu Glu Phe Tyr Thr  
 305 310 315 320  
 Lys Gly Arg Phe Pro Ser Gln Leu Thr Ala Ala Asp Ile Gly Glu Lys  
 325 330 335  
 Glu Val Lys Thr Ala Gly Gly Pro Thr Glu Gly Gln Ser Val Arg Ile  
 340 345 350  
 Pro Leu Lys Ala Arg Gly Met Met Asp Tyr Leu Met Pro Ser Val Met  
 355 360 365  
 Asn Leu Ile Ala Leu Pro Val Leu Ala Phe Ala Met Arg Tyr Ala Val  
 370 375 380  
 Gln Gln Ala Ser Gly  
 385

<210> 20

<211> 687

<212> DNA

<213> Shewanella hanedai

<220>

<221> CDS

<222> (1)..(684)

<223> LPAAT

<400> 20

|   |     |
|---|-----|
| atg tta ctg cta gca ttt gtt ttt ggt ggt ctt gtt tgt tta tta aga | 48  |
| Met Leu Leu Leu Ala Phe Val Phe Gly Gly Leu Val Cys Leu Leu Arg |     |
| 1 5 10 15   |     |
| ccg aga cat cgt gac aat gta cac atg ttc gct aaa att ttc tcc tat | 96  |
| Pro Arg His Arg Asp Asn Val His Met Phe Ala Lys Ile Phe Ser Tyr |     |
| 20 25 30  |     |
| gct gcg cca gta tta ggt atc aag gtc ata gta cgt aaa cct agc gta | 144 |
| Ala Ala Pro Val Leu Gly Ile Lys Val Ile Val Arg Lys Pro Ser Val |     |
| 35 40 45  |     |
| gcg acg act gag cct tgt gtc ttt ttg gca aat cat cag aat aat ttc | 192 |
| Ala Thr Thr Glu Pro Cys Val Phe Leu Ala Asn His Gln Asn Asn Phe |     |
| 50 55 60  |     |
| gat atg ttt acc cat act gcg gca gta ccg aaa ggg acg gtc agt ctt | 240 |
| Asp Met Phe Thr His Thr Ala Ala Val Pro Lys Gly Thr Val Ser Leu |     |
| 65 70 75 80   |     |
| gga aag aag agt tta gct tgg gtg cct ttt ttt ggt cag att tac tgg | 288 |
| Gly Lys Lys Ser Leu Ala Trp Val Pro Phe Phe Gly Gln Ile Tyr Trp |     |
| 85 90 95  |     |
| ttg tcc ggt aat att cta att gac aga aaa aac cgc aat aga gcg ttt | 336 |
| Leu Ser Gly Asn Ile Leu Ile Asp Arg Lys Asn Arg Asn Arg Ala Phe |     |
| 100 105 110   |     |

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gaa acc atg gcg caa acc gcc aaa aag att aaa gat aag tgc tta tct      384
Glu Thr Met Ala Gln Thr Ala Lys Lys Ile Lys Asp Lys Cys Leu Ser
      115                      120                      125
atc tgg ata ttt ccg gaa ggt acg cgc tct cgt ggc aag ggc tta ttg      432
Ile Trp Ile Phe Pro Glu Gly Thr Arg Ser Arg Gly Lys Gly Leu Leu
      130                      135                      140
cct ttt aaa tct ggt gca ttt cat act gca ata gat gcg gga gtg gct      480
Pro Phe Lys Ser Gly Ala Phe His Thr Ala Ile Asp Ala Gly Val Ala
      145                      150                      155                      160
atg gta cct gtg ttg gca tca aat caa agc cat ata aaa ctt aat cgt      528
Met Val Pro Val Leu Ala Ser Asn Gln Ser His Ile Lys Leu Asn Arg
      165                      170                      175
tgg aat aat ggt gtg gtt att atc gag atg atg gat cca atc gaa act      576
Trp Asn Asn Gly Val Val Ile Ile Glu Met Met Asp Pro Ile Glu Thr
      180                      185                      190
aaa ggt ttg gct aag tct cag gta aag gag ttg tct aaa cgt atc cac      624
Lys Gly Leu Ala Lys Ser Gln Val Lys Glu Leu Ser Lys Arg Ile His
      195                      200                      205
gct atg atg tcg aat cgt tta act cag ttg gat caa gaa gct tca gcc      672
Ala Met Met Ser Asn Arg Leu Thr Gln Leu Asp Gln Glu Ala Ser Ala
      210                      215                      220
tta atg gca aag taa
Leu Met Ala Lys
225

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<210> 21

<211> 228

<212> PRT

<213> Shewanella hanedai

<400> 21

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Met Leu Leu Leu Ala Phe Val Phe Gly Gly Leu Val Cys Leu Leu Arg
1      5      10      15
Pro Arg His Arg Asp Asn Val His Met Phe Ala Lys Ile Phe Ser Tyr
      20      25      30
Ala Ala Pro Val Leu Gly Ile Lys Val Ile Val Arg Lys Pro Ser Val
      35      40      45
Ala Thr Thr Glu Pro Cys Val Phe Leu Ala Asn His Gln Asn Asn Phe
      50      55      60
Asp Met Phe Thr His Thr Ala Ala Val Pro Lys Gly Thr Val Ser Leu
65      70      75      80
Gly Lys Lys Ser Leu Ala Trp Val Pro Phe Phe Gly Gln Ile Tyr Trp
      85      90      95
Leu Ser Gly Asn Ile Leu Ile Asp Arg Lys Asn Arg Asn Arg Ala Phe
      100     105     110
Glu Thr Met Ala Gln Thr Ala Lys Lys Ile Lys Asp Lys Cys Leu Ser
      115     120     125
Ile Trp Ile Phe Pro Glu Gly Thr Arg Ser Arg Gly Lys Gly Leu Leu
      130     135     140
Pro Phe Lys Ser Gly Ala Phe His Thr Ala Ile Asp Ala Gly Val Ala
145     150     155     160
Met Val Pro Val Leu Ala Ser Asn Gln Ser His Ile Lys Leu Asn Arg
      165     170     175
Trp Asn Asn Gly Val Val Ile Ile Glu Met Met Asp Pro Ile Glu Thr
      180     185     190

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[illegible]

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<220>

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<222> (39) .. (1340)

<223> GPAT

<400> 22

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|-----------|------------|------------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ggcgcaagg | taaccgcctt | ctgccgcaag | ccttgact | atg | ccg | tcg | ctg | ttt | cgg |     | 56  |     |     |     |     |     |
|           |            |            |          | Met | Pro | Ser | Leu | Phe | Arg |     |     |     |     |     |     |     |
|           |            |            |          | 1   |     |     |     | 5   |     |     |     |     |     |     |     |     |
| gcg       | aaa        | cgc        | aat      | ggc | aga | agg | acg | ccg | ggg | aat | gcc | gtg | acc | aat | ttc | 104 |
| Ala       | Lys        | Arg        | Asn      | Gly | Arg | Arg | Thr | Pro | Gly | Asn | Ala | Val | Thr | Asn | Phe |     |
|           |            | 10         |          |     |     |     | 15  |     |     |     |     | 20  |     |     |     |     |
| ggg       | aaa        | tct        | gaa      | ttc | cat | cgt | gaa | att | agt | ggg | agt | acg | cgg | gcg | acc | 152 |
| Gly       | Lys        | Ser        | Glu      | Phe | His | Arg | Glu | Ile | Ser | Gly | Ser | Thr | Arg | Ala | Thr |     |
|           |            | 25         |          |     |     | 30  |     |     |     |     | 35  |     |     |     |     |     |
| acg       | cag        | gtg        | gct      | gaa | gcc | acc | aca | gct | ggt | ctt | agg | gag | acc | att | gag | 200 |
| Thr       | Gln        | Val        | Ala      | Glu | Ala | Thr | Thr | Ala | Gly | Leu | Arg | Glu | Thr | Ile | Glu |     |
|           | 40         |            |          |     | 45  |     |     |     |     | 50  |     |     |     |     |     |     |
| gac       | cgc        | gct        | att      | atc | gac | ggt | cat | tct | cac | agt | ttt | gaa | gga | att | caa | 248 |
| Asp       | Arg        | Ala        | Ile      | Ile | Asp | Gly | His | Ser | His | Ser | Phe | Glu | Gly | Ile | Gln |     |
| 55        |            |            |          | 60  |     |     |     | 65  |     |     |     | 70  |     |     |     |     |
| tcg       | gaa        | gaa        | gag      | ttg | atg | cag | gta | att | gaa | aag | gag | gtg | gaa | tcc | ggt | 296 |
| Ser       | Glu        | Glu        | Glu      | Leu | Met | Gln | Val | Ile | Glu | Lys | Glu | Val | Glu | Ser | Gly |     |
|           |            |            | 75       |     |     |     |     | 80  |     |     |     | 85  |     |     |     |     |
| cgg       | ctg        | ccg        | aag      | cgt | gct | ggc | gcg | gga | atg | gta | gag | ttg | tat | cgc | aat | 344 |
| Arg       | Leu        | Pro        | Lys      | Arg | Ala | Gly | Ala | Gly | Met | Val | Glu | Leu | Tyr | Arg | Asn |     |
|           |            | 90         |          |     |     | 95  |     |     |     |     | 100 |     |     |     |     |     |
| tat       | cga        | gat        | gct      | gta | gtg | agc | agt | ggc | gta | gaa | aat | gcg | atg | gat | att | 392 |
| Tyr       | Arg        | Asp        | Ala      | Val | Val | Ser | Ser | Gly | Val | Glu | Asn | Ala | Met | Asp | Ile |     |
|           |            | 105        |          |     |     | 110 |     |     |     |     | 115 |     |     |     |     |     |
| gtt       | gtg        | aaa        | gtc      | atg | tca | act | gtg | ttg | gac | cgg | att | ctt | ctg | cag | ttc | 440 |
| Val       | Val        | Lys        | Val      | Met | Ser | Thr | Val | Leu | Asp | Arg | Ile | Leu | Leu | Gln | Phe |     |
|           |            | 120        |          |     |     | 125 |     |     |     |     | 130 |     |     |     |     |     |
| gag       | gag        | cca        | ttc      | aca | ttt | gga | tcg | cac | cac | aag | aga | atg | gtg | gag | ccg | 488 |
| Glu       | Glu        | Pro        | Phe      | Thr | Phe | Gly | Ser | His | His | Lys | Arg | Met | Val | Glu | Pro |     |
| 135       |            |            |          | 140 |     |     |     |     |     | 145 |     |     | 150 |     |     |     |
| tat       | gat        | tac        | tac      | aca | ttt | ggt | cag | aac | tat | gtg | cgt | cct | ctc | cta | gat | 536 |
| Tyr       | Asp        | Tyr        | Tyr      | Thr | Phe | Gly | Gln | Asn | Tyr | Val | Arg | Pro | Leu | Leu | Asp |     |
|           |            |            | 155      |     |     |     |     | 160 |     |     |     | 165 |     |     |     |     |
| ttc       | agg        | aac        | tct      | tac | ctt | ggg | aac | tta | aag | atc | ttt | gac | cag | ata | gag | 584 |
| Phe       | Arg        | Asn        | Ser      | Tyr | Leu | Gly | Asn | Leu | Lys | Ile | Phe | Asp | Gln | Ile | Glu |     |
|           |            | 170        |          |     |     |     |     | 175 |     |     |     | 180 |     |     |     |     |
| aaq       | aac        | ctg        | aaa      | qaq | qqq | cac | aac | qtc | att | ttt | cta | tcc | aat | cac | caq | 632 |

|     |     |     |     |     |     |     |     |     |     |     |     |       |       |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|-------|-----|-----|------|
| Lys | Asn | Leu | Lys | Glu | Gly | His | Asn | Val | Ile | Phe | Leu | Ser   | Asn   | His | Gln |      |
|     | 185 |     |     |     |     |     | 190 |     |     |     |     | 195   |       |     |     |      |
| act | gag | gca | gat | cct | gct | gtt | atg | gcg | ctg | ttg | ctt | gag   | cac   | tct | cac | 680  |
| Thr | Glu | Ala | Asp | Pro | Ala | Val | Met | Ala | Leu | Leu | Leu | Glu   | His   | Ser | His |      |
|     | 200 |     |     |     |     |     | 205 |     |     |     | 210 |       |       |     |     |      |
| ccc | tat | ttg | gca | gag | aac | ttg | acc | tat | gtg | gct | gga | gac   | agg   | gtt | gtg | 728  |
| Pro | Tyr | Leu | Ala | Glu | Asn | Leu | Thr | Tyr | Val | Ala | Gly | Asp   | Arg   | Val | Val |      |
| 215 |     |     |     |     | 220 |     |     |     |     | 225 |     |       |       |     | 230 |      |
| ctg | gat | cca | ttc | tgc | aaa | cct | ttt | agt | atg | ggc | agg | aat   | ctc   | ttg | tgc | 776  |
| Leu | Asp | Pro | Phe | Cys | Lys | Pro | Phe | Ser | Met | Gly | Arg | Asn   | Leu   | Leu | Cys |      |
|     |     |     |     | 235 |     |     |     | 240 |     |     |     |       | 245   |     |     |      |
| gtg | tat | tca | aaa | aag | cac | att | cac | gat | gta | ccg | gac | ctt   | gct   | gaa | atg | 824  |
| Val | Tyr | Ser | Lys | Lys | His | Ile | His | Asp | Val | Pro | Asp | Leu   | Ala   | Glu | Met |      |
|     |     |     | 250 |     |     |     |     | 255 |     |     |     |       | 260   |     |     |      |
| aaa | atc | aaa | gct | aat | gcg | aag | act | ttg | aga | cag | atg | acg   | atc   | ctg | ctg | 872  |
| Lys | Ile | Lys | Ala | Asn | Ala | Lys | Thr | Leu | Arg | Gln | Met | Thr   | Ile   | Leu | Leu |      |
|     | 265 |     |     |     |     |     | 270 |     |     |     |     | 275   |       |     |     |      |
| agg | cag | gga | ggt | caa | tta | tta | tgg | gta | gca | ccc | agt | ggg   | gga   | cgc | gat | 920  |
| Arg | Gln | Gly | Gly | Gln | Leu | Leu | Trp | Val | Ala | Pro | Ser | Gly   | Gly   | Arg | Asp |      |
|     | 280 |     |     |     |     | 285 |     |     |     | 290 |     |       |       |     |     |      |
| cgc | cct | gat | cct | gag | acc | aac | gaa | tgg | gtt | cct | gca | cat   | ttt   | gac | tcg | 968  |
| Arg | Pro | Asp | Pro | Glu | Thr | Asn | Glu | Trp | Val | Pro | Ala | His   | Phe   | Asp | Ser |      |
| 295 |     |     |     |     | 300 |     |     |     |     | 305 |     |       |       |     | 310 |      |
| tct | gct | gtg | gag | aat | atg | aag | cga | cta | tct | gac | att | gtc   | cga   | gta | cct | 1016 |
| Ser | Ala | Val | Glu | Asn | Met | Lys | Arg | Leu | Ser | Asp | Ile | Val   | Arg   | Val | Pro |      |
|     |     |     |     | 315 |     |     |     |     | 320 |     |     |       | 325   |     |     |      |
| gct | cat | tta | cat | gcc | cta | tca | tta | cta | tgt | ttt | gag | att   | atg   | cca | cct | 1064 |
| Ala | His | Leu | His | Ala | Leu | Ser | Leu | Leu | Cys | Phe | Glu | Ile   | Met   | Pro | Pro |      |
|     |     |     | 330 |     |     |     | 335 |     |     |     |     | 340   |       |     |     |      |
| cct | gtc | cag | gta | caa | aag | gag | cta | gga | gag | cga | aga | gca   | gta   | gga | ttt | 1112 |
| Pro | Val | Gln | Val | Gln | Lys | Glu | Leu | Gly | Glu | Arg | Arg | Ala   | Val   | Gly | Phe |      |
|     |     | 345 |     |     |     |     | 350 |     |     |     |     | 355   |       |     |     |      |
| agc | gga | gtt | ggt | cta | gcc | gtt | tcc | gag | caa | cta | gat | tat   | gat   | tcc | att | 1160 |
| Ser | Gly | Val | Gly | Leu | Ala | Val | Ser | Glu | Gln | Leu | Asp | Tyr   | Asp   | Ser | Ile |      |
|     | 360 |     |     |     |     | 365 |     |     |     |     | 370 |       |       |     |     |      |
| gcg | aag | tta | gtc | gac | gat | tcc | aaa | aat | gcg | aag | gat | gcc   | ttt   | tcg | gat | 1208 |
| Ala | Lys | Leu | Val | Asp | Asp | Ser | Lys | Asn | Ala | Lys | Asp | Ala   | Phe   | Ser | Asp |      |
| 375 |     |     |     |     | 380 |     |     |     |     | 385 |     |       |       |     | 390 |      |
| gcg | gca | tgg | agc | gaa | gtc | aat | gat | atg | tat | aac | gtg | tta   | aaa   | gaa | gca | 1256 |
| Ala | Ala | Trp | Ser | Glu | Val | Asn | Asp | Met | Tyr | Asn | Val | Leu   | Lys   | Glu | Ala |      |
|     |     |     |     | 395 |     |     |     |     | 400 |     |     |       |       | 405 |     |      |
| att | tat | ggt | gac | caa | ggt | tgt | gct | gtt | agc | aca | gat | tcc   | ttg   | aga | ctg | 1304 |
| Ile | Tyr | Gly | Asp | Gln | Gly | Cys | Ala | Val | Ser | Thr | Asp | Ser   | Leu   | Arg | Leu |      |
|     |     |     | 410 |     |     |     | 415 |     |     |     |     | 420   |       |     |     |      |
| gaa | cag | ccc | tgg | ttt | gat | gga | agc | agg | cga | act | gat | tgaaa | atagg | gc  |     | 1352 |
| Glu | Gln | Pro | Trp | Phe | Asp | Gly | Ser | Arg | Arg | Thr | Asp |       |       |     |     |      |
|     |     | 425 |     |     |     |     | 430 |     |     |     |     |       |       |     |     |      |

&lt;210&gt; 23

&lt;211&gt; 434

&lt;212&gt; PRT

&lt;213&gt; Physcomitrella patens

&lt;400&gt; 23

Met Pro Ser Leu Phe Arg Ala Lys Arg Asn Gly Arg Arg Thr Pro Gly

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   | Asn | Ala | Val | Thr | Asn | Phe | Gly | Lys | Ser | Glu | Phe | His | Arg | Glu | Ile | Ser |
|     |     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Gly | Ser | Thr | Arg | Ala | Thr | Thr | Gln | Val | Ala | Glu | Ala | Thr | Thr | Ala | Gly |     |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |
| Leu | Arg | Glu | Thr | Ile | Glu | Asp | Arg | Ala | Ile | Ile | Asp | Gly | His | Ser | His |     |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |
| Ser | Phe | Glu | Gly | Ile | Gln | Ser | Glu | Glu | Glu | Leu | Met | Gln | Val | Ile | Glu |     |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Lys | Glu | Val | Glu | Ser | Gly | Arg | Leu | Pro | Lys | Arg | Ala | Gly | Ala | Gly | Met |     |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |
| Val | Glu | Leu | Tyr | Arg | Asn | Tyr | Arg | Asp | Ala | Val | Val | Ser | Ser | Gly | Val |     |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |     |
| Glu | Asn | Ala | Met | Asp | Ile | Val | Val | Lys | Val | Met | Ser | Thr | Val | Leu | Asp |     |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |     |
| Arg | Ile | Leu | Leu | Gln | Phe | Glu | Glu | Pro | Phe | Thr | Phe | Gly | Ser | His | His |     |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |     |
| Lys | Arg | Met | Val | Glu | Pro | Tyr | Asp | Tyr | Tyr | Thr | Phe | Gly | Gln | Asn | Tyr |     |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |     |
| Val | Arg | Pro | Leu | Leu | Asp | Phe | Arg | Asn | Ser | Tyr | Leu | Gly | Asn | Leu | Lys |     |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |     |     |
| Ile | Phe | Asp | Gln | Ile | Glu | Lys | Asn | Leu | Lys | Glu | Gly | His | Asn | Val | Ile |     |
|     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |     |     |
| Phe | Leu | Ser | Asn | His | Gln | Thr | Glu | Ala | Asp | Pro | Ala | Val | Met | Ala | Leu |     |
|     | 195 |     |     |     |     |     | 200 |     |     |     | 205 |     |     |     |     |     |
| Leu | Leu | Glu | His | Ser | His | Pro | Tyr | Leu | Ala | Glu | Asn | Leu | Thr | Tyr | Val |     |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |     |
| Ala | Gly | Asp | Arg | Val | Val | Leu | Asp | Pro | Phe | Cys | Lys | Pro | Phe | Ser | Met |     |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |
| Gly | Arg | Asn | Leu | Leu | Cys | Val | Tyr | Ser | Lys | Lys | His | Ile | His | Asp | Val |     |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |     |
| Pro | Asp | Leu | Ala | Glu | Met | Lys | Ile | Lys | Ala | Asn | Ala | Lys | Thr | Leu | Arg |     |
|     |     | 260 |     |     |     |     |     | 265 |     |     |     |     | 270 |     |     |     |
| Gln | Met | Thr | Ile | Leu | Leu | Arg | Gln | Gly | Gly | Gln | Leu | Leu | Trp | Val | Ala |     |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |     |
| Pro | Ser | Gly | Gly | Arg | Asp | Arg | Pro | Asp | Pro | Glu | Thr | Asn | Glu | Trp | Val |     |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |     |
| Pro | Ala | His | Phe | Asp | Ser | Ser | Ala | Val | Glu | Asn | Met | Lys | Arg | Leu | Ser |     |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |     |
| Asp | Ile | Val | Arg | Val | Pro | Ala | His | Leu | His | Ala | Leu | Ser | Leu | Leu | Cys |     |
|     |     |     | 325 |     |     |     |     |     | 330 |     |     |     | 335 |     |     |     |
| Phe | Glu | Ile | Met | Pro | Pro | Pro | Val | Gln | Val | Gln | Lys | Glu | Leu | Gly | Glu |     |
|     |     | 340 |     |     |     |     |     | 345 |     |     |     | 350 |     |     |     |     |
| Arg | Arg | Ala | Val | Gly | Phe | Ser | Gly | Val | Gly | Leu | Ala | Val | Ser | Glu | Gln |     |
|     | 355 |     |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |     |
| Leu | Asp | Tyr | Asp | Ser | Ile | Ala | Lys | Leu | Val | Asp | Asp | Ser | Lys | Asn | Ala |     |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |     |
| Lys | Asp | Ala | Phe | Ser | Asp | Ala | Ala | Trp | Ser | Glu | Val | Asn | Asp | Met | Tyr |     |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |     |
| Asn | Val | Leu | Lys | Glu | Ala | Ile | Tyr | Gly | Asp | Gln | Gly | Cys | Ala | Val | Ser |     |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |     |
| Thr | Asp | Ser | Leu | Arg | Leu | Glu | Gln | Pro | Trp | Phe | Asp | Gly | Ser | Arg | Arg |     |
|     |     | 420 |     |     |     |     |     | 425 |     |     |     |     | 430 |     |     |     |
| Thr | Asp |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

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 <213> Physcomitrella patens

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 <223> GPAT/LPAAT

<400> 24

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agg cgg gtc cct atg tct gat ctg cct gag gga gcc aac gcg att tct      96
Arg Arg Val Pro Met Ser Asp Leu Pro Glu Gly Ala Asn Ala Ile Ser
           20           25           30
aaa tgg tgt cac gat gcc ttt cac atc aag gac gat cgg ctg gag cag      144
Lys Trp Cys His Asp Ala Phe His Ile Lys Asp Asp Arg Leu Glu Gln
           35           40           45
cac gaa aaa gag aat acg ttt ggg gag gac ttg tat att cct att gaa      192
His Glu Lys Glu Asn Thr Phe Gly Glu Asp Leu Tyr Ile Pro Ile Glu
           50           55           60
cgg cca ctt aaa cct ctt att att gtg atc tcc tgg gcc atc act ttg      240
Arg Pro Leu Lys Pro Leu Ile Ile Val Ile Ser Trp Ala Ile Thr Leu
65           70           75           80
ctg gct gca gca tgg tgg ttt cta aga cga gtt tta tcc act tgg aaa      288
Leu Ala Ala Ala Trp Trp Phe Leu Arg Arg Val Leu Ser Thr Trp Lys
           85           90           95
gga atc gcc tgg gtg gca gga gta ctc gtg gtc gtc atg ctg tgt gtc      336
Gly Ile Ala Trp Val Ala Gly Val Leu Val Val Val Met Leu Cys Val
           100          105          110
cag att tta gtg atg tcg tca caa tcg gaa aga agt tca gat cct gca      384
Gln Ile Leu Val Met Ser Ser Gln Ser Glu Arg Ser Ser Asp Pro Ala
           115          120          125
gct aag aag gcc aat caa aaa cag gcg gct tct gtt gct cac ctc ggc      432
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aaa acg gac tga
Lys Thr Asp
145

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<211> 147  
 <212> PRT  
 <213> Physcomitrella patens

<400> 25

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Arg Arg Val Pro Met Ser Asp Leu Pro Glu Gly Ala Asn Ala Ile Ser
           20           25           30
Lys Trp Cys His Asp Ala Phe His Ile Lys Asp Asp Arg Leu Glu Gln
           35           40           45

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His Glu Lys Glu Asn Thr Phe Gly Glu Asp Leu Tyr Ile Pro Ile Glu  
 50 55 60  
 Arg Pro Leu Lys Pro Leu Ile Ile Val Ile Ser Trp Ala Ile Thr Leu  
 65 70 75 80  
 Leu Ala Ala Ala Trp Trp Phe Leu Arg Arg Val Leu Ser Thr Trp Lys  
 85 90 95  
 Gly Ile Ala Trp Val Ala Gly Val Leu Val Val Val Met Leu Cys Val  
 100 105 110  
 Gln Ile Leu Val Met Ser Ser Gln Ser Glu Arg Ser Ser Asp Pro Ala  
 115 120 125  
 Ala Lys Lys Ala Asn Gln Lys Gln Ala Ala Ser Val Ala His Leu Gly  
 130 135 140  
 Lys Thr Asp  
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<210> 26

<211> 1710

<212> DNA

<213> *Physcomitrella patens*

<220>

<221> CDS

<222> (246)..(1394)

<223> GPAT/LPAAT

<400> 26

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 gtcacattgc gtgttggcca tgtcctgggt gcagctctcg tgaccctcac gctcgcgagc 120  
 ggcaccgctc gtcttctgcc tcttgcttgc tcttgcttgc tttctgagga acagccccag 180  
 ctccggcacc agcataaggt cgtgtaggga gagagagaga gggggagaga agtaagcttg 240  
 gagtc atg gag ggc ggg ggc tcc ata atc gct ctt cct ctg ggg ctt atg 290  
 Met Glu Gly Gly Gly Ser Ile Ile Ala Leu Pro Leu Gly Leu Met  
 1 5 10 15  
 ttc ctc ttc tcc ggg ttc ttt atc aat atc ctg cag ctg ctg tcg gtg 338  
 Phe Leu Phe Ser Gly Phe Phe Ile Asn Ile Leu Gln Leu Leu Ser Val  
 20 25 30  
 tta ttc att ttg ccg ttt tcg agg agg gcg tac cga gta gtg aat atg 386  
 Leu Phe Ile Leu Pro Phe Ser Arg Arg Ala Tyr Arg Val Val Asn Met  
 35 40 45  
 att atg atg gag gtg ctg tgg tcg gag ctt ata tgg ctg ctg gat tgg 434  
 Ile Met Met Glu Val Leu Trp Ser Glu Leu Ile Trp Leu Leu Asp Trp  
 50 55 60  
 tgg gcg aat gtg aag gtg aag gtt tac acg cca aag gag tcg tgg gag 482  
 Trp Ala Asn Val Lys Val Lys Val Tyr Thr Pro Lys Glu Ser Trp Glu  
 65 70 75  
 cac tta gga aag gag cac gca tta ctc att tgt aat cac cgc agt gac 530  
 His Leu Gly Lys Glu His Ala Leu Leu Ile Cys Asn His Arg Ser Asp  
 80 85 90 95  
 ata gat tgg ctc gta gga tgg att att gcc cag aga ttg ggg tgt cta 578  
 Ile Asp Trp Leu Val Gly Trp Ile Ile Ala Gln Arg Leu Gly Cys Leu  
 100 105 110  
 ggt ggg act cga gct gtt atg aag aag tcc acc aaa ttt ctt ccg gtc 626  
 Gly Gly Thr Arg Ala Val Met Lys Lys Ser Thr Lys Phe Leu Pro Val  
 115 120 125  
 att ggc tgg tct atg tgg ttt tca gag tat gtg ttt tta tca aga gat 674

|   |      |
|---|------|
| Ile Gly Trp Ser Met Trp Phe Ser Glu Tyr Val Phe Leu Ser Arg Asp   |      |
| 130   | 135  |
| tgg gcc aaa gat gag aag gtc ttg aag aat ggt tat tca agt ctt aag   | 722  |
| Trp Ala Lys Asp Glu Lys Val Leu Lys Asn Gly Tyr Ser Ser Leu Lys   |      |
| 145   | 150  |
| ggc ttc ccc agg acc ttg tgg gtg gct ctt ttt gtg gaa ggc act cga   | 770  |
| Gly Phe Pro Arg Thr Leu Trp Val Ala Leu Phe Val Glu Gly Thr Arg   |      |
| 160   | 165  |
| ttt acg aag gcc aaa ctt gag gct gcc caa aaa ttt gca gcg gat aca   | 818  |
| Phe Thr Lys Ala Lys Leu Glu Ala Ala Gln Lys Phe Ala Ala Asp Thr   |      |
| 180   | 185  |
| ggg cta cgt gtt cca agg cat gtg ctt gtt cct cgc aca aaa ggg ttc   | 866  |
| Gly Leu Arg Val Pro Arg His Val Leu Val Pro Arg Thr Lys Gly Phe   |      |
| 195   | 200  |
| gtt tgc gct gtg gag aac ttg cgt gaa ttt gtt ccg gta gtt tat gac   | 914  |
| Val Ser Ala Val Glu Asn Leu Arg Glu Phe Val Pro Val Val Tyr Asp   |      |
| 210   | 215  |
| atg acc gtt gct ata tct aaa gag ctg ccc aat cct aca atg atc cgg   | 962  |
| Met Thr Val Ala Ile Ser Lys Glu Leu Pro Asn Pro Thr Met Ile Arg   |      |
| 225   | 230  |
| att ttc aga ggg caa cca tct gtg gtt cat gtg cac gtg aga cgg gtc   | 1010 |
| Ile Phe Arg Gly Gln Pro Ser Val Val His Val His Val Arg Arg Val   |      |
| 240   | 245  |
| cct atg tct gat ctg cct gag gga gcc aac gcg att tct aaa tgg tgt   | 1058 |
| Pro Met Ser Asp Leu Pro Glu Gly Ala Asn Ala Ile Ser Lys Trp Cys   |      |
| 260   | 265  |
| cac gat gcc ttt cac atc aag gac gat cgg ctg gag cag cac gaa aaa   | 1106 |
| His Asp Ala Phe His Ile Lys Asp Asp Arg Leu Glu Gln His Glu Lys   |      |
| 275   | 280  |
| gag aat acg ttt ggg gag gac ttg tat att cct att gaa cgg cca ctt   | 1154 |
| Glu Asn Thr Phe Gly Glu Asp Leu Tyr Ile Pro Ile Glu Arg Pro Leu   |      |
| 290   | 295  |
| aaa cct ctt att att gtg atc tcc tgg gcc atc act ttg ctg gct gca   | 1202 |
| Lys Pro Leu Ile Ile Val Ile Ser Trp Ala Ile Thr Leu Leu Ala Ala   |      |
| 305   | 310  |
| gca tgg tgg ttt cta aga cga gtt tta tcc act tgg aaa gga atc gcc   | 1250 |
| Ala Trp Trp Phe Leu Arg Arg Val Leu Ser Thr Trp Lys Gly Ile Ala   |      |
| 320   | 325  |
| tgg gtg gca gga gta ctc gtg gtc gtc atg ctg tgt gtc cag att tta   | 1298 |
| Trp Val Ala Gly Val Leu Val Val Val Met Leu Cys Val Gln Ile Leu   |      |
| 340   | 345  |
| gtg atg tgc tca caa tgc gaa aga agt tca gat cct gca gct aag aag   | 1346 |
| Val Met Ser Ser Gln Ser Glu Arg Ser Ser Asp Pro Ala Ala Lys Lys   |      |
| 355   | 360  |
| gcc aat caa aaa cag gcg gct tct gtt gct cac ctc ggc aaa acg gac   | 1394 |
| Ala Asn Gln Lys Gln Ala Ala Ser Val Ala His Leu Gly Lys Thr Asp   |      |
| 370   | 375  |
| tgagaacttt tgctttaacg caatccaaga cttaggcgtg ctagtctcag ttacaattag | 1454 |
| cattcaggca ctccagatgt gtcaagaaat tttagttact ctagccaaga attgtttgac | 1514 |
| acctttagt ccacctaat tccctgaacg attaagagca gcggccatta gatgattcga   | 1574 |
| tttggtttct tgatagtatc tgggtacctc ttcttcaagc attgtgtatt ccgcttcagc | 1634 |
| cattcctttt tttaagatgt attgcttctc gttcgagggt aggtcatttc tgatctaatt | 1694 |
| ttgaaagcac taattc   | 1710 |

&lt;210&gt; 27

&lt;211&gt; 383

<212> PRT  
 <213> Physcomitrella patens

<400> 27

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Met Glu Gly Gly Gly Ser Ile Ile Ala Leu Pro Leu Gly Leu Met Phe
1      5      10      15
Leu Phe Ser Gly Phe Phe Ile Asn Ile Leu Gln Leu Leu Ser Val Leu
20      25      30
Phe Ile Leu Pro Phe Ser Arg Arg Ala Tyr Arg Val Val Asn Met Ile
35      40      45
Met Met Glu Val Leu Trp Ser Glu Leu Ile Trp Leu Leu Asp Trp Trp
50      55      60
Ala Asn Val Lys Val Lys Val Tyr Thr Pro Lys Glu Ser Trp Glu His
65      70      75      80
Leu Gly Lys Glu His Ala Leu Leu Ile Cys Asn His Arg Ser Asp Ile
85      90      95
Asp Trp Leu Val Gly Trp Ile Ile Ala Gln Arg Leu Gly Cys Leu Gly
100      105      110
Gly Thr Arg Ala Val Met Lys Lys Ser Thr Lys Phe Leu Pro Val Ile
115      120      125
Gly Trp Ser Met Trp Phe Ser Glu Tyr Val Phe Leu Ser Arg Asp Trp
130      135      140
Ala Lys Asp Glu Lys Val Leu Lys Asn Gly Tyr Ser Ser Leu Lys Gly
145      150      155      160
Phe Pro Arg Thr Leu Trp Val Ala Leu Phe Val Glu Gly Thr Arg Phe
165      170      175
Thr Lys Ala Lys Leu Glu Ala Ala Gln Lys Phe Ala Ala Asp Thr Gly
180      185      190
Leu Arg Val Pro Arg His Val Leu Val Pro Arg Thr Lys Gly Phe Val
195      200      205
Ser Ala Val Glu Asn Leu Arg Glu Phe Val Pro Val Val Tyr Asp Met
210      215      220
Thr Val Ala Ile Ser Lys Glu Leu Pro Asn Pro Thr Met Ile Arg Ile
225      230      235      240
Phe Arg Gly Gln Pro Ser Val Val His Val His Val Arg Arg Val Pro
245      250      255
Met Ser Asp Leu Pro Glu Gly Ala Asn Ala Ile Ser Lys Trp Cys His
260      265      270
Asp Ala Phe His Ile Lys Asp Asp Arg Leu Glu Gln His Glu Lys Glu
275      280      285
Asn Thr Phe Gly Glu Asp Leu Tyr Ile Pro Ile Glu Arg Pro Leu Lys
290      295      300
Pro Leu Ile Ile Val Ile Ser Trp Ala Ile Thr Leu Leu Ala Ala Ala
305      310      315      320
Trp Trp Phe Leu Arg Arg Val Leu Ser Thr Trp Lys Gly Ile Ala Trp
325      330      335
Val Ala Gly Val Leu Val Val Val Met Leu Cys Val Gln Ile Leu Val
340      345      350
Met Ser Ser Gln Ser Glu Arg Ser Ser Asp Pro Ala Ala Lys Lys Ala
355      360      365
Asn Gln Lys Gln Ala Ala Ser Val Ala His Leu Gly Lys Thr Asp
370      375      380

```

<210> 28

<211> 628

<212> DNA  
 <213> Cryptocodinium cohnii

<220>  
 <221> CDS  
 <222> (3)..(578)  
 <223> DAGAT

<400> 28

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tt gat gat tgg atc gcc gcg ttg gcg act gct tgt gca agc acg gat      47
  Asp Asp Trp Ile Ala Ala Leu Ala Thr Ala Cys Ala Ser Thr Asp
    1           5           10           15
ggg gtt acg gac gtc gac agc ctg aag ccc tca gca agt gca gtt ccc      95
Gly Val Thr Asp Val Asp Ser Leu Lys Pro Ser Ala Ser Ala Val Pro
          20           25           30
cat gga ccc ccc aag gcg aag gtc agt gag cta tcg gcc ctg cgc aag      143
His Gly Pro Pro Lys Ala Lys Val Ser Glu Leu Ser Ala Leu Arg Lys
          35           40           45
gtg cac aat cga aac cgg acc agc gtt ttg acc aac gag gac gga ggc      191
Val His Asn Arg Asn Arg Thr Ser Val Leu Thr Asn Glu Asp Gly Gly
          50           55           60
att cct gag tgc aac gtt gtg ggg atc gtg aac ctc tgt gtt act gtg      239
Ile Pro Glu Cys Asn Val Val Gly Ile Val Asn Leu Cys Val Thr Val
          65           70           75
atg gtc ttg atc cac ctg cgc ctc att tat gag agc atc cgg aag cac      287
Met Val Leu Ile His Leu Arg Leu Ile Tyr Glu Ser Ile Arg Lys His
          80           85           90           95
ggt gtt ttg ttg gac acc ttc cgg gtg gcg gcc cac acc gca ctc aag      335
Gly Val Leu Leu Asp Thr Phe Arg Val Ala Ala His Thr Ala Leu Lys
          100          105          110
cca ggt aac ttc cag tgt acg ctt tgt ttc gct ttg ccg gtc ctg      383
Pro Gly Asn Phe Gln Cys Thr Leu Cys Phe Phe Ala Leu Pro Val Leu
          115          120          125
gcc atc ttg gcg acc ttc att gag gtc ttg gcg agc aag gga cag ttg      431
Ala Ile Leu Ala Thr Phe Ile Glu Val Leu Ala Ser Lys Gly Gln Leu
          130          135          140
ggg atc tcg ctt cgc gag cac cct gca tgc cgg gct ttg tac aat ctg      479
Gly Ile Ser Leu Arg Glu His Pro Ala Cys Arg Ala Leu Tyr Asn Leu
          145          150          155
cct tac cat ccc tgt cct ggt cat cca cca ctt tca ggc aac tcc tct      527
Pro Tyr His Pro Cys Pro Gly His Pro Pro Leu Ser Gly Asn Ser Ser
          160          165          170          175
cgt ggg agc ctc gtt gct gat tgc tgc gac cac tct ctt ctt gaa agt      575
Arg Gly Ser Leu Val Ala Asp Cys Cys Asp His Ser Leu Leu Glu Ser
          180          185          190
tgg tgagcttcgc ccacgtgaat tggctctcgg cgacagtgga aggcgatgga      628
Trp

```

<210> 29  
 <211> 192  
 <212> PRT  
 <213> Cryptocodinium cohnii



&lt;400&gt; 29

Asp Asp Trp Ile Ala Ala Leu Ala Thr Ala Cys Ala Ser Thr Asp Gly  
 1 5 10 15  
 Val Thr Asp Val Asp Ser Leu Lys Pro Ser Ala Ser Ala Val Pro His  
 20 25 30  
 Gly Pro Pro Lys Ala Lys Val Ser Glu Leu Ser Ala Leu Arg Lys Val  
 35 40 45  
 His Asn Arg Asn Arg Thr Ser Val Leu Thr Asn Glu Asp Gly Gly Ile  
 50 55 60  
 Pro Glu Cys Asn Val Val Gly Ile Val Asn Leu Cys Val Thr Val Met  
 65 70 75 80  
 Val Leu Ile His Leu Arg Leu Ile Tyr Glu Ser Ile Arg Lys His Gly  
 85 90 95  
 Val Leu Leu Asp Thr Phe Arg Val Ala Ala His Thr Ala Leu Lys Pro  
 100 105 110  
 Gly Asn Phe Gln Cys Thr Leu Cys Phe Phe Ala Leu Pro Val Leu Ala  
 115 120 125  
 Ile Leu Ala Thr Phe Ile Glu Val Leu Ala Ser Lys Gly Gln Leu Gly  
 130 135 140  
 Ile Ser Leu Arg Glu His Pro Ala Cys Arg Ala Leu Tyr Asn Leu Pro  
 145 150 155 160  
 Tyr His Pro Cys Pro Gly His Pro Pro Leu Ser Gly Asn Ser Ser Arg  
 165 170 175  
 Gly Ser Leu Val Ala Asp Cys Cys Asp His Ser Leu Leu Glu Ser Trp  
 180 185 190

&lt;210&gt; 30

&lt;211&gt; 1272

&lt;212&gt; DNA

&lt;213&gt; Cryptocodium cohnii

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (164)..(1120)

&lt;223&gt; DAGAT

&lt;400&gt; 30

ggacactgac atggactgaa ggagtagaaa gccgtagcca ttttggtca agctccagtg 60  
 aacagtcgcg ccctgactgc agaggggtgc ggcacaaacc ctcagataca cacacatccc 120  
 gtgagtttat agattcttgt ctcgcgctct tcttgtgcaa gcg atg gct gga aag 175  
 Met Ala Gly Lys  
 1  
 tgg atg ctg ctc agt ggt ggt gca gca gct gca gcg ttg gcg ctt ctg 223  
 Trp Met Leu Leu Ser Gly Gly Ala Ala Ala Ala Leu Ala Leu Leu  
 5 10 15 20  
 gag ggc acc cag ctt cga gcg tcg aca tcg gca cgc gcc cgg ata ttg 271  
 Glu Gly Thr Gln Leu Arg Ala Ser Thr Ser Ala Arg Ala Arg Ile Leu  
 25 30 35  
 ctg gtt tcg ttg gca gca tat ctc cca acg tac ctc gat gga agc gag 319  
 Leu Val Ser Leu Ala Ala Tyr Leu Pro Thr Tyr Leu Asp Gly Ser Glu  
 40 45 50  
 tac cgg gct gcc cct cga cga agc gag cga gcc tca cgg gtc ctg cgg 367  
 Tyr Arg Ala Ala Pro Arg Arg Ser Glu Arg Ala Ser Arg Val Leu Arg  
 55 60 65

```

cag ttg tac aaa gtc atg gta aat tgg ttc ttc aca atc aaa cgg cca      415
Gln Leu Tyr Lys Val Met Val Asn Trp Phe Phe Thr Ile Lys Arg Pro
70                               75                               80

gta atc gag gct tcc gaa gag ctg aca gct tgt gac cag tgc atc ttg      463
Val Ile Glu Ala Ser Glu Glu Leu Thr Ala Cys Asp Gln Cys Ile Leu
85                               90                               95                               100

gcg gtc cat ccc cat gga gta cct tct ctc gac cat ttg ctg acg gtc      511
Ala Val His Pro His Gly Val Pro Ser Leu Asp His Leu Leu Thr Val
105                               110                               115

atc gcc tat gat cct gac ttg gaa cgg gtg ttg ccc cag ttg cgg aga      559
Ile Ala Tyr Asp Pro Asp Leu Glu Arg Val Leu Pro Gln Leu Arg Arg
120                               125                               130

agt gcc ttg agt gca ggt gtc ctg ttc aag att ccc att ctg cgc gag      607
Ser Ala Leu Ser Ala Gly Val Leu Phe Lys Ile Pro Ile Leu Arg Glu
135                               140                               145

gtc ctt ctg tgg act ggc tgt gtc gac gct ggc ggg aag acc gtg gac      655
Val Leu Leu Trp Thr Gly Cys Val Asp Ala Gly Gly Lys Thr Val Asp
150                               155                               160

tct tgc ttg aag gct ggt ctc agc ctt tct gtt gtg ccc ggc ggc gaa      703
Ser Cys Leu Lys Ala Gly Leu Ser Leu Ser Val Val Pro Gly Gly Glu
165                               170                               175                               180

cgc gag caa ctt ctc gca cag cga ggg aac aag gaa atc ctc gtg ctg      751
Arg Glu Gln Leu Leu Ala Gln Arg Gly Asn Lys Glu Ile Leu Val Leu
185                               190                               195

aaa cac agg aag ggc ttt gtc aag tac gcc ttg agg cat ggc att ccg      799
Lys His Arg Lys Gly Phe Val Lys Tyr Ala Leu Arg His Gly Ile Pro
200                               205                               210

ttg gta cct gtg tat tgc ttc ggc gag aac caa ctt ttt tgg cag tcc      847
Leu Val Pro Val Tyr Cys Phe Gly Glu Asn Gln Leu Phe Trp Gln Ser
215                               220                               225

tcc ttc ctc ttc aag gtt cgc agt tgg ctg cgg cgc act ctg gga gtg      895
Ser Phe Leu Phe Lys Val Arg Ser Trp Leu Arg Arg Thr Leu Gly Val
230                               235                               240

gcg ctc gtg ttg ccc tac gga ggc tgc tgc aat ctg cct ggt gtg ccc      943
Ala Leu Val Leu Pro Tyr Gly Gly Cys Cys Asn Leu Pro Gly Val Pro
245                               250                               255                               260

ttc tcg gag ccg gtg cag ctc gtc gtc gga gct ccc ttg aag ctt ccg      991
Phe Ser Glu Pro Val Gln Leu Val Val Gly Ala Pro Leu Lys Leu Pro
265                               270                               275

aag atc gaa gag ccg agc gga gtg gaa ata gcc aag tgg cac gct cgg      1039
Lys Ile Glu Glu Pro Ser Gly Val Glu Ile Ala Lys Trp His Ala Arg
280                               285                               290

tac atg gag tgt ttg gaa gcc ttg ttc aag cgg cac cga gtt gaa gct      1087
Tyr Met Glu Cys Leu Glu Ala Leu Phe Lys Arg His Arg Val Glu Ala
295                               300                               305

gga tat cct gaa ttg gaa ctc gag ttc atc tga aggtttcaag tttacatgtg      1140
Gly Tyr Pro Glu Leu Glu Leu Glu Phe Ile
310                               315

tctcacagtc ctccgctctg agccccactc attgtagtta ctcttctatg tgtgcaacgt      1200
cgaccacagg agttaccgtc aaagacgggt gctccttgct gcttcgagag aaaaaaaaaa      1260
aaaaaaaaaa aa                                                         1272

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<210> 31

<211> 318

<212> PRT

<213> Cryptocodium cohnii

&lt;400&gt; 31

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Met Ala Gly Lys Trp Met Leu Leu Ser Gly Gly Ala Ala Ala Ala Ala
1      5      10      15
Leu Ala Leu Leu Glu Gly Thr Gln Leu Arg Ala Ser Thr Ser Ala Arg
20     25     30
Ala Arg Ile Leu Leu Val Ser Leu Ala Ala Tyr Leu Pro Thr Tyr Leu
35     40     45
Asp Gly Ser Glu Tyr Arg Ala Ala Pro Arg Arg Ser Glu Arg Ala Ser
50     55     60
Arg Val Leu Arg Gln Leu Tyr Lys Val Met Val Asn Trp Phe Phe Thr
65     70     75     80
Ile Lys Arg Pro Val Ile Glu Ala Ser Glu Glu Leu Thr Ala Cys Asp
85     90     95
Gln Cys Ile Leu Ala Val His Pro His Gly Val Pro Ser Leu Asp His
100    105    110
Leu Leu Thr Val Ile Ala Tyr Asp Pro Asp Leu Glu Arg Val Leu Pro
115    120    125
Gln Leu Arg Arg Ser Ala Leu Ser Ala Gly Val Leu Phe Lys Ile Pro
130    135    140
Ile Leu Arg Glu Val Leu Leu Trp Thr Gly Cys Val Asp Ala Gly Gly
145    150    155    160
Lys Thr Val Asp Ser Cys Leu Lys Ala Gly Leu Ser Leu Ser Val Val
165    170    175
Pro Gly Gly Glu Arg Glu Gln Leu Leu Ala Gln Arg Gly Asn Lys Glu
180    185    190
Ile Leu Val Leu Lys His Arg Lys Gly Phe Val Lys Tyr Ala Leu Arg
195    200    205
His Gly Ile Pro Leu Val Pro Val Tyr Cys Phe Gly Glu Asn Gln Leu
210    215    220
Phe Trp Gln Ser Ser Phe Leu Phe Lys Val Arg Ser Trp Leu Arg Arg
225    230    235    240
Thr Leu Gly Val Ala Leu Val Leu Pro Tyr Gly Gly Cys Cys Asn Leu
245    250    255
Pro Gly Val Pro Phe Ser Glu Pro Val Gln Leu Val Val Gly Ala Pro
260    265    270
Leu Lys Leu Pro Lys Ile Glu Glu Pro Ser Gly Val Glu Ile Ala Lys
275    280    285
Trp His Ala Arg Tyr Met Glu Cys Leu Glu Ala Leu Phe Lys Arg His
290    295    300
Arg Val Glu Ala Gly Tyr Pro Glu Leu Glu Leu Glu Phe Ile
305    310    315

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&lt;210&gt; 32

&lt;211&gt; 448

&lt;212&gt; DNA

&lt;213&gt; Cryptocodium cohnii

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(426)

&lt;223&gt; DAGAT

&lt;400&gt; 32

atc aag atg gtg ccg ttt ttg aag aac gtg ctg ggg ctc ttt ggg ctg

48

|           |            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----------|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile       | Lys        | Met | Val | Pro | Phe | Leu | Lys | Asn | Val | Leu | Gly | Leu | Phe | Gly | Leu |     |
| 1         |            |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |     |
| atc       | gac        | gcg | agc | aag | cag | gtg | ttg | gtc | aag | cga | ttg | aag | cgc | cca | ggg | 96  |
| Ile       | Asp        | Ala | Ser | Lys | Gln | Val | Leu | Val | Lys | Arg | Leu | Lys | Arg | Pro | Gly |     |
|           |            |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |     |
| ggg       | tcc        | ctg | gtg | att | tac | atc | gga | ggg | atg | gtg | gag | ctc | ttc | atg | tcc | 144 |
| Gly       | Ser        | Leu | Val | Ile | Tyr | Ile | Gly | Gly | Met | Val | Glu | Leu | Phe | Met | Ser |     |
|           |            | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |     |
| agc       | ccc        | aag | cag | gaa | gtc | gtc | ttc | ttg | aag | aag | agg | aag | ggg | ttt | atc | 192 |
| Ser       | Pro        | Lys | Gln | Glu | Val | Val | Phe | Leu | Lys | Lys | Arg | Lys | Gly | Phe | Ile |     |
|           | 50         |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |
| cga       | ctc        | gct | ctg | agc | aca | ggg | gcc | gat | gtc | gtg | ccg | atc | tac | ttg | ttc | 240 |
| Arg       | Leu        | Ala | Leu | Ser | Thr | Gly | Ala | Asp | Val | Val | Pro | Ile | Tyr | Leu | Phe |     |
| 65        |            |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| ggc       | aac        | acc | acc | gtg | ctc | tca | gtg | ctg | acc | gct | ggc | cct | ctg | gcc | tct | 288 |
| Gly       | Asn        | Thr | Thr | Val | Leu | Ser | Val | Leu | Thr | Ala | Gly | Pro | Leu | Ala | Ser |     |
|           |            |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |
| ctg       | agc        | cgt | gcc | gcc | ggg | gtg | tca | gtg | acc | att | ttt | tgg | gga | cgc | ttc | 336 |
| Leu       | Ser        | Arg | Ala | Ala | Gly | Val | Ser | Val | Thr | Ile | Phe | Trp | Gly | Arg | Phe |     |
|           |            |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |     |
| ggc       | ttg        | ccg | atg | ccc | tac | ccc | gtc | aag | ctc | acc | tat | gcc | cgt | ggc | cgt | 384 |
| Gly       | Leu        | Pro | Met | Pro | Tyr | Pro | Val | Lys | Leu | Thr | Tyr | Ala | Arg | Gly | Arg |     |
|           |            | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |     |
| ccc       | atc        | ggg | ctc | cct | cat | atc | gaa | atc | cta | cag | atg | aga | cat |     |     | 426 |
| Pro       | Ile        | Gly | Leu | Pro | His | Ile | Glu | Ile | Leu | Gln | Met | Arg | His |     |     |     |
|           | 130        |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |     |
| tgaccgttg | catgacgtgt | ac  |     |     |     |     |     |     |     |     |     |     |     |     |     | 448 |

&lt;210&gt; 33

&lt;211&gt; 142

&lt;212&gt; PRT

&lt;213&gt; Cryptocodium cohnii

&lt;400&gt; 33

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Ile | Lys | Met | Val | Pro | Phe | Leu | Lys | Asn | Val | Leu | Gly | Leu | Phe | Gly | Leu |  |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |  |
| Ile | Asp | Ala | Ser | Lys | Gln | Val | Leu | Val | Lys | Arg | Leu | Lys | Arg | Pro | Gly |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Gly | Ser | Leu | Val | Ile | Tyr | Ile | Gly | Gly | Met | Val | Glu | Leu | Phe | Met | Ser |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |  |
| Ser | Pro | Lys | Gln | Glu | Val | Val | Phe | Leu | Lys | Lys | Arg | Lys | Gly | Phe | Ile |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| Arg | Leu | Ala | Leu | Ser | Thr | Gly | Ala | Asp | Val | Val | Pro | Ile | Tyr | Leu | Phe |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |
| Gly | Asn | Thr | Thr | Val | Leu | Ser | Val | Leu | Thr | Ala | Gly | Pro | Leu | Ala | Ser |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |
| Leu | Ser | Arg | Ala | Ala | Gly | Val | Ser | Val | Thr | Ile | Phe | Trp | Gly | Arg | Phe |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |
| Gly | Leu | Pro | Met | Pro | Tyr | Pro | Val | Lys | Leu | Thr | Tyr | Ala | Arg | Gly | Arg |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Pro | Ile | Gly | Leu | Pro | His | Ile | Glu | Ile | Leu | Gln | Met | Arg | His |     |     |  |
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<220>  
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<400> 34

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      Met Cys Ser Ile Ser Cys Gly Ser Thr Pro Gln Gln
      1          5          10
ctc tgt cat tac agg aag agc ggg gag ctg att aca aga aag agt cgc      159
Leu Cys His Tyr Arg Lys Ser Gly Glu Leu Ile Thr Arg Lys Ser Arg
      15          20          25
gca gct att cgg tgg tgg agg tat ggc caa caa tgc aag gtg ctg ttg      207
Ala Ala Ile Arg Trp Trp Arg Tyr Gly Gln Gln Cys Lys Val Leu Leu
      30          35          40
ccg ttg gat ttg att cga tca tcg tct caa ttc ttc atc gta gtt ctc      255
Pro Leu Asp Leu Ile Arg Ser Ser Ser Gln Phe Phe Ile Val Val Leu
      45          50          55          60
act ctg acg ctc ttc ctg ttc acc acg tgt gga gct gtg cat act gcg      303
Thr Leu Thr Leu Phe Leu Phe Thr Thr Cys Gly Ala Val His Thr Ala
      65          70          75
gca caa gac aga tca ttc gca aca ttg agc caa aga tca aga gcg tct      351
Ala Gln Asp Arg Ser Phe Ala Thr Leu Ser Gln Arg Ser Arg Ala Ser
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ctc ttc agt gtg gga cgg gca caa gca agg aac aaa cac cat ttg gcg      399
Leu Phe Ser Val Gly Arg Ala Gln Ala Arg Asn Lys His His Leu Ala
      95          100          105
ccg gtg gtc ata gtt cca ggc acc ggc ggg aat caa cta gag gcc agg      447
Pro Val Val Ile Val Pro Gly Thr Gly Gly Asn Gln Leu Glu Ala Arg
      110          115          120
ttg aca gct gat tac gag gct aac aag cca tgg tgc tac agc ttc aga      495
Leu Thr Ala Asp Tyr Glu Ala Asn Lys Pro Trp Cys Tyr Ser Phe Arg
      125          130          135          140
aaa gat tac ttc agg ttg tgg ctg gat gtg aaa aca ctg ttt cca cct      543
Lys Asp Tyr Phe Arg Leu Trp Leu Asp Val Lys Thr Leu Phe Pro Pro
      145          150          155
ttc acg acg tgt ttc gcc gac cgc ctg agc ttg gac tac aac ccg cag      591
Phe Thr Thr Cys Phe Ala Asp Arg Leu Ser Leu Asp Tyr Asn Pro Gln
      160          165          170
tcc gat gcc tat agc aac atc aag ggc gtg aag acg cgg gta ccg ttt      639
Ser Asp Ala Tyr Ser Asn Ile Lys Gly Val Lys Thr Arg Val Pro Phe
      175          180          185
ttt ggt act acc gaa gga atg gag tac ctg gat ccc tca ctc aaa ttc      687
Phe Gly Thr Thr Glu Gly Met Glu Tyr Leu Asp Pro Ser Leu Lys Phe
      190          195          200
ttg aca ggc tac atg ata cac ttg gtg aac gca tta aaa gct cat ggt      735
Leu Thr Gly Tyr Met Ile His Leu Val Asn Ala Leu Lys Ala His Gly
      205          210          215          220
tac gag aac gga aag tca tta tac gga gct cca tac gac ttt cgg ttc      783
Tyr Glu Asn Gly Lys Ser Leu Tyr Gly Ala Pro Tyr Asp Phe Arg Phe
      225          230          235

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|   |      |
|---|------|
| gca ccg ggg cca cat gca tcc aac gta gct cta gag tac ctg aaa gac   | 831  |
| Ala Pro Gly Pro His Ala Ser Asn Val Ala Leu Glu Tyr Leu Lys Asp   |      |
| 240 245 250   |      |
| ctg aaa gat ctc ata gaa acc gcg tac tca gta aat gcc aac gag ccg   | 879  |
| Leu Lys Asp Leu Ile Glu Thr Ala Tyr Ser Val Asn Ala Asn Glu Pro   |      |
| 255 260 265   |      |
| gtg gtc atc ctc gct cac agc atg ggc ggg ttg tgg act ctc ttc ttc   | 927  |
| Val Val Ile Leu Ala His Ser Met Gly Gly Leu Trp Thr Leu Phe Phe   |      |
| 270 275 280   |      |
| ctg aac cag caa tcc atg gag tgg agg aac aaa tac gtt tcc cgc ttt   | 975  |
| Leu Asn Gln Gln Ser Met Glu Trp Arg Asn Lys Tyr Val Ser Arg Phe   |      |
| 285 290 295 300   |      |
| gtg tct gta gct acc ccg tgg gga ggg gcg gtc gaa cag atg atg acc   | 1023 |
| Val Ser Val Ala Thr Pro Trp Gly Gly Ala Val Glu Gln Met Met Thr   |      |
| 305 310 315   |      |
| ttc gca tcc ggc aat ccg gag gga gtt ccc ttt gtg aac tcc ctg gtc   | 1071 |
| Phe Ala Ser Gly Asn Pro Glu Gly Val Pro Phe Val Asn Ser Leu Val   |      |
| 320 325 330   |      |
| gtg cgc gaa gag cag cgg cgc tca gag tct aac ttg tgg ctg ctg cca   | 1119 |
| Val Arg Glu Glu Gln Arg Arg Ser Glu Ser Asn Leu Trp Leu Leu Pro   |      |
| 335 340 345   |      |
| gtg cgg cgc tgc ttc aga gac cga cca ttg gta att acc tcg tcg cgc   | 1167 |
| Val Arg Arg Cys Phe Arg Asp Arg Pro Leu Val Ile Thr Ser Ser Arg   |      |
| 350 355 360   |      |
| aac tac aca gct ggg gac atg gaa cag ttt ctg tgc gac atc ggt ttc   | 1215 |
| Asn Tyr Thr Ala Gly Asp Met Glu Gln Phe Leu Cys Asp Ile Gly Phe   |      |
| 365 370 375 380   |      |
| cct gaa ggg gtc gcg cca tac aaa tcc cgg ata ccg cac cta acg gac   | 1263 |
| Pro Glu Gly Val Ala Pro Tyr Lys Ser Arg Ile Pro His Leu Thr Asp   |      |
| 385 390 395   |      |
| att cta caa cct cct caa gtc ccc gtc acc cta att cac ggc tat ggc   | 1311 |
| Ile Leu Gln Pro Pro Gln Val Pro Val Thr Leu Ile His Gly Tyr Gly   |      |
| 400 405 410   |      |
| gtg ccg acg gcg gag aca cta agc tac gag aag aag gga ttc gac aac   | 1359 |
| Val Pro Thr Ala Glu Thr Leu Ser Tyr Glu Lys Lys Gly Phe Asp Asn   |      |
| 415 420 425   |      |
| cat ccc gaa atc aca gaa ggt gat ggc gac ggg acg gtg aat gtg tgc   | 1407 |
| His Pro Glu Ile Thr Glu Gly Asp Gly Asp Gly Thr Val Asn Val Cys   |      |
| 430 435 440   |      |
| agc ttg acc gcg gtg gtt gag gaa tgg gag cga gtc gca ggt cag gag   | 1455 |
| Ser Leu Thr Ala Val Val Glu Glu Trp Glu Arg Val Ala Gly Gln Glu   |      |
| 445 450 455 460   |      |
| ttg gaa atg att gcg ctg cat ggc aaa caa cat atg caa atc ttg cac   | 1503 |
| Leu Glu Met Ile Ala Leu His Gly Lys Gln His Met Gln Ile Leu His   |      |
| 465 470 475   |      |
| gac gac cat tct gtg caa gtg atc gtg gac gcc att ctc aat gtt acc   | 1551 |
| Asp Asp His Ser Val Gln Val Ile Val Asp Ala Ile Leu Asn Val Thr   |      |
| 480 485 490   |      |
| cca cag gaa cag ctt atg ttc cac taa gccctaatacg taaccctaaa        | 1598 |
| Pro Gln Glu Gln Leu Met Phe His                                   |      |
| 495 500   |      |
| cctagctcca atcctcacag gatcaggcca cattctcctt gaaaaacagc ataaggtcga | 1658 |
| ttctccgcag cctctcttcc attccacctc cccctttgta tctctctcca ttcaattgta | 1718 |
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<211> 500
<212> PRT
<213> Physcomitrella patens
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<400> 35

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| Met<br>1   | Cys        | Ser        | Ile        | Ser<br>5   | Cys        | Gly        | Ser        | Thr        | Pro<br>10  | Gln        | Gln        | Leu        | Cys        | His<br>15  | Tyr        |
| Arg        | Lys        | Ser        | Gly<br>20  | Glu        | Leu        | Ile        | Thr        | Arg<br>25  | Lys        | Ser        | Arg        | Ala        | Ala<br>30  | Ile        | Arg        |
| Trp        | Trp        | Arg<br>35  | Tyr        | Gly        | Gln        | Gln        | Cys<br>40  | Lys        | Val        | Leu        | Leu        | Pro<br>45  | Leu        | Asp        | Leu        |
| Ile        | Arg<br>50  | Ser        | Ser        | Ser        | Gln        | Phe<br>55  | Phe        | Ile        | Val        | Val        | Leu        | Thr<br>60  | Leu        | Thr        | Leu        |
| Phe<br>65  | Leu        | Phe        | Thr        | Thr        | Cys<br>70  | Gly        | Ala        | Val        | His<br>75  | Thr        | Ala        | Ala        | Gln        | Asp<br>80  | Arg        |
| Ser        | Phe        | Ala        | Thr        | Leu<br>85  | Ser        | Gln        | Arg        | Ser        | Arg<br>90  | Ala        | Ser        | Leu        | Phe<br>95  | Ser        | Val        |
| Gly        | Arg        | Ala        | Gln<br>100 | Ala        | Arg        | Asn        | Lys        | His<br>105 | His        | Leu        | Ala        | Pro<br>110 | Val        | Val        | Ile        |
| Val        | Pro        | Gly<br>115 | Thr        | Gly        | Gly        | Asn        | Gln<br>120 | Leu        | Glu        | Ala        | Arg        | Leu<br>125 | Thr        | Ala        | Asp        |
| Tyr        | Glu<br>130 | Ala        | Asn        | Lys        | Pro        | Trp<br>135 | Cys        | Tyr        | Ser        | Phe        | Arg<br>140 | Lys        | Asp        | Tyr        | Phe        |
| Arg<br>145 | Leu        | Trp        | Leu        | Asp<br>150 | Val        | Lys        | Thr        | Leu        | Phe        | Pro<br>155 | Pro        | Phe        | Thr        | Thr        | Cys<br>160 |
| Phe        | Ala        | Asp        | Arg        | Leu<br>165 | Ser        | Leu        | Asp        | Tyr        | Asn<br>170 | Pro        | Gln        | Ser        | Asp<br>175 | Ala        | Tyr        |
| Ser        | Asn        | Ile        | Lys<br>180 | Gly        | Val        | Lys        | Thr        | Arg<br>185 | Val        | Pro        | Phe        | Phe<br>190 | Gly        | Thr        | Thr        |
| Glu        | Gly        | Met<br>195 | Glu        | Tyr        | Leu        | Asp        | Pro<br>200 | Ser        | Leu        | Lys        | Phe        | Leu<br>205 | Thr        | Gly        | Tyr        |
| Met        | Ile<br>210 | His        | Leu        | Val        | Asn        | Ala<br>215 | Leu        | Lys        | Ala        | His        | Gly<br>220 | Tyr        | Glu        | Asn        | Gly        |
| Lys<br>225 | Ser        | Leu        | Tyr        | Gly<br>230 | Ala        | Pro        | Tyr        | Asp        | Phe        | Arg<br>235 | Phe        | Ala        | Pro        | Gly        | Pro<br>240 |
| His        | Ala        | Ser        | Asn<br>245 | Val        | Ala        | Leu        | Glu        | Tyr        | Leu<br>250 | Lys        | Asp        | Leu        | Lys        | Asp<br>255 | Leu        |
| Ile        | Glu        | Thr        | Ala<br>260 | Tyr        | Ser        | Val        | Asn        | Ala<br>265 | Asn        | Glu        | Pro        | Val<br>270 | Val        | Ile        | Leu        |
| Ala        | His        | Ser<br>275 | Met        | Gly        | Gly        | Leu        | Trp<br>280 | Thr        | Leu        | Phe        | Phe        | Leu<br>285 | Asn        | Gln        | Gln        |
| Ser        | Met<br>290 | Glu        | Trp        | Arg        | Asn        | Lys<br>295 | Tyr        | Val        | Ser        | Arg        | Phe<br>300 | Val        | Ser        | Val        | Ala        |
| Thr<br>305 | Pro        | Trp        | Gly        | Gly<br>310 | Ala        | Val        | Glu        | Gln        | Met        | Met<br>315 | Thr        | Phe        | Ala        | Ser        | Gly<br>320 |
| Asn        | Pro        | Glu        | Gly<br>325 | Val        | Pro        | Phe        | Val        | Asn<br>330 | Ser        | Leu        | Val        | Val<br>335 | Arg        | Glu        | Glu        |
| Gln        | Arg        | Arg        | Ser<br>340 | Glu        | Ser        | Asn        | Leu        | Trp<br>345 | Leu        | Leu        | Pro        | Val<br>350 | Arg        | Arg        | Cys        |
| Phe        | Arg<br>355 | Asp        | Arg        | Pro        | Leu        | Val        | Ile<br>360 | Thr        | Ser        | Ser        | Arg        | Asn<br>365 | Tyr        | Thr        | Ala        |
| Gly        | Asp<br>370 | Met        | Glu        | Gln        | Phe        | Leu<br>375 | Cys        | Asp        | Ile        | Gly        | Phe<br>380 | Pro        | Glu        | Gly        | Val        |
| Ala<br>385 | Pro        | Tyr        | Lys        | Ser        | Arg<br>390 | Ile        | Pro        | His        | Leu        | Thr<br>395 | Asp        | Ile        | Leu        | Gln        | Pro<br>400 |
| Pro        | Gln        | Val        | Pro        | Val        | Thr        | Leu        | Ile        | His        | Gly        | Tyr        | Gly        | Val        | Pro        | Thr        | Ala        |

405 410 415  
 Glu Thr Leu Ser Tyr Glu' Lys Lys Gly Phe Asp Asn His Pro Glu Ile  
 420 425 430  
 Thr Glu Gly Asp Gly Asp Gly Thr Val Asn Val Cys Ser Leu Thr Ala  
 435 440 445  
 Val Val Glu Glu Trp Glu Arg Val Ala Gly Gln Glu Leu Glu Met Ile  
 450 455 460  
 Ala Leu His Gly Lys Gln His Met Gln Ile Leu His Asp Asp His Ser  
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<211> 1893

<212> DNA

<213> *Fusarium gramineum*

<220>

<221> CDS

<222> (1)..(1893)

<223> LCAT

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 aac gat agc gcc gac gct gac gac act ccg aga gaa gaa agc cca acg 96  
 Asn Asp Ser Ala Asp Ala Asp Asp Thr Pro Arg Glu Glu Ser Pro Thr  
 20 25 30  
 gct gag ccg acc aca cac gtt cga gtt gtt caa cac gcc gtg ccc aga 144  
 Ala Glu Pro Thr Thr His Val Arg Val Val Gln His Ala Val Pro Arg  
 35 40 45  
 acc cga aaa cgc cgc aac acc ttc gtc ttc ttc ctt ggt agt ttg ttt 192  
 Thr Arg Lys Arg Arg Asn Thr Phe Val Phe Phe Leu Gly Ser Leu Phe  
 50 55 60  
 gga att ata gcc gcc gga ttt ttc gct tcc agc aat gat ctt att gac 240  
 Gly Ile Ile Ala Ala Gly Phe Phe Ala Ser Ser Asn Asp Leu Ile Asp  
 65 70 75 80  
 ctc ccc gag ttt acc gac ttg tcg atg gat aac ttg atg gat gtt ctg 288  
 Leu Pro Glu Phe Thr Asp Leu Ser Met Asp Asn Leu Met Asp Val Leu  
 85 90 95  
 cct gcc ggc ttg ata aag gac atg cgc gac ctt gtt cag ggc gag cgg 336  
 Pro Ala Gly Leu Ile Lys Asp Met Arg Asp Leu Val Gln Gly Glu Arg  
 100 105 110  
 gac att gcc gaa tcg tac gag cca ttc tct gtt ggc gaa aag gct cga 384  
 Asp Ile Ala Glu Ser Tyr Glu Pro Phe Ser Val Gly Glu Lys Ala Arg  
 115 120 125  
 tcc gag ggt cta gga gtt cac cat cct atg atc atg ata cct ggt gtt 432  
 Ser Glu Gly Leu Gly Val His His Pro Met Ile Met Ile Pro Gly Val  
 130 135 140  
 atc tca act gga ctc gaa tcg tgg ggt acg gct aat atc tcg aaa ccc 480  
 Ile Ser Thr Gly Leu Glu Ser Trp Gly Thr Ala Asn Ile Ser Lys Pro  
 145 150 155 160



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| tac | ttt | aga | aaa | cga | ctt | tgg | ggt | agt | tgg | aca | atg | atg | aga | gct | ctg | 528  |
| Tyr | Phe | Arg | Lys | Arg | Leu | Trp | Gly | Ser | Trp | Thr | Met | Met | Arg | Ala | Leu |      |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |      |
| gtt | atg | gac | aag | gag | gtt | tgg | aag | aag | cac | gtc | atg | ctc | gac | aag | agg | 576  |
| Val | Met | Asp | Lys | Glu | Val | Trp | Lys | Lys | His | Val | Met | Leu | Asp | Lys | Arg |      |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |      |
| acg | ggc | ctt | gac | ccg | cct | gac | gta | aag | ttg | agg | gct | gcc | caa | ggg | ttc | 624  |
| Thr | Gly | Leu | Asp | Pro | Pro | Asp | Val | Lys | Leu | Arg | Ala | Ala | Gln | Gly | Phe |      |
|     |     | 195 |     |     |     |     | 200 |     |     |     | 205 |     |     |     |     |      |
| gat | gcg | acc | gat | ttc | ttc | atc | acg | gga | tat | tgg | atc | tgg | agc | aaa | atc | 672  |
| Asp | Ala | Thr | Asp | Phe | Phe | Ile | Thr | Gly | Tyr | Trp | Ile | Trp | Ser | Lys | Ile |      |
|     | 210 |     |     |     |     | 215 |     |     |     | 220 |     |     |     |     |     |      |
| ttt | gag | aat | ctc | gca | tcc | atc | ggc | tac | gac | cca | acg | aac | tcg | ttc | acg | 720  |
| Phe | Glu | Asn | Leu | Ala | Ser | Ile | Gly | Tyr | Asp | Pro | Thr | Asn | Ser | Phe | Thr |      |
| 225 |     |     |     |     | 230 |     |     |     | 235 |     |     |     |     |     | 240 |      |
| gct | gct | tac | gat | tgg | cgc | ttg | tcg | tat | ccc | aac | ctt | gag | gta | cgg | gac | 768  |
| Ala | Ala | Tyr | Asp | Trp | Arg | Leu | Ser | Tyr | Pro | Asn | Leu | Glu | Val | Arg | Asp |      |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |      |
| cgc | tac | ttc | act | cgg | cta | aag | tcg | cat | atc | gaa | atc | gcg | gtg | gcc | act | 816  |
| Arg | Tyr | Phe | Thr | Arg | Leu | Lys | Ser | His | Ile | Glu | Ile | Ala | Val | Ala | Thr |      |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| gag | gac | aaa | aaa | gtc | gtc | ctc | gca | tca | cac | agt | atg | ggg | agc | caa | gtc | 864  |
| Glu | Asp | Lys | Lys | Val | Val | Leu | Ala | Ser | His | Ser | Met | Gly | Ser | Gln | Val |      |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |      |
| ctt | tac | tat | ttt | ctc | cac | tgg | gtg | cag | tca | gaa | aga | ggc | gga | cgc | ggt | 912  |
| Leu | Tyr | Tyr | Phe | Leu | His | Trp | Val | Gln | Ser | Glu | Arg | Gly | Gly | Arg | Gly |      |
|     | 290 |     |     |     |     | 295 |     |     |     | 300 |     |     |     |     |     |      |
| ggg | ccg | gat | tgg | gtt | gag | cgt | cac | att | gac | gcc | tgg | atc | aac | atc | agc | 960  |
| Gly | Pro | Asp | Trp | Val | Glu | Arg | His | Ile | Asp | Ala | Trp | Ile | Asn | Ile | Ser |      |
| 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |     |      |
| gga | tgc | atg | ctt | gga | gca | gtc | aag | gat | ttg | acc | gct | gtg | ctc | tcc | ggc | 1008 |
| Gly | Cys | Met | Leu | Gly | Ala | Val | Lys | Asp | Leu | Thr | Ala | Val | Leu | Ser | Gly |      |
|     |     |     | 325 |     |     |     |     |     | 330 |     |     |     |     | 335 |     |      |
| gag | atg | cgc | gac | aca | gct | caa | ctg | aac | ccg | ttc | gct | att | tac | ggc | ctg | 1056 |
| Glu | Met | Arg | Asp | Thr | Ala | Gln | Leu | Asn | Pro | Phe | Ala | Ile | Tyr | Gly | Leu |      |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |      |
| gaa | aag | ttc | ttg | agt | aaa | gag | gag | aga | gcc | gag | atc | ttt | cgc | ggc | atg | 1104 |
| Glu | Lys | Phe | Leu | Ser | Lys | Glu | Glu | Arg | Ala | Glu | Ile | Phe | Arg | Gly | Met |      |
|     |     | 355 |     |     |     | 360 |     |     |     |     |     | 365 |     |     |     |      |
| ccc | ggg | ata | tcc | tcc | atg | ttg | ccc | atc | ggc | ggc | aac | tct | gta | tgg | ggt | 1152 |
| Pro | Gly | Ile | Ser | Ser | Met | Leu | Pro | Ile | Gly | Gly | Asn | Ser | Val | Trp | Gly |      |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |      |
| aac | ttg | acc | tgg | gct | cca | gac | gac | ttg | cca | ggc | cag | aac | cgt | tca | tat | 1200 |
| Asn | Leu | Thr | Trp | Ala | Pro | Asp | Asp | Leu | Pro | Gly | Gln | Asn | Arg | Ser | Tyr |      |
| 385 |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |     |      |
| gga | tct | ctc | ttg | aac | ttt | agg | gtc | ggt | tcg | aac | tgg | aca | act | cct | gat | 1248 |
| Gly | Ser | Leu | Leu | Asn | Phe | Arg | Val | Gly | Ser | Asn | Trp | Thr | Thr | Pro | Asp |      |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |      |
| cgt | aac | ttt | acc | gtc | gag | gaa | ggt | gtg | tcc | tat | ttg | ctt | aac | aca | acg | 1296 |
| Arg | Asn | Phe | Thr | Val | Glu | Glu | Gly | Val | Ser | Tyr | Leu | Leu | Asn | Thr | Thr |      |
|     |     | 420 |     |     |     |     | 425 |     |     |     |     |     | 430 |     |     |      |
| gag | gac | tgg | tat | caa | gac | cag | atc | aag | ggc | agt | tat | tct | cgg | ggc | att | 1344 |
| Glu | Asp | Trp | Tyr | Gln | Asp | Gln | Ile | Lys | Gly | Ser | Tyr | Ser | Arg | Gly | Ile |      |
|     |     | 435 |     |     |     | 440 |     |     |     |     |     | 445 |     |     |     |      |
| gct | cat | tcc | ata | gat | gag | gtc | gaa | gcc | aat | gag | aat | gac | ccc | aag | aag | 1392 |
| Ala | His | Ser | Ile | Asp | Glu | Val | Glu | Ala | Asn | Glu | Asn | Asp | Pro | Lys | Lys |      |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |      |

|   |      |
|---|------|
| tgg atc aat cct ctc gag acg cga ttg cca ctt gct cct agc ctc aag | 1440 |
| Trp Ile Asn Pro Leu Glu Thr Arg Leu Pro Leu Ala Pro Ser Leu Lys |      |
| 465 470 475 480   |      |
| atc tac tgc ttt tat ggt gtt gga aaa ccg acc gag cga ggg tac ttc | 1488 |
| Ile Tyr Cys Phe Tyr Gly Val Gly Lys Pro Thr Glu Arg Gly Tyr Phe |      |
| 485 490 495   |      |
| tat aag cca ccg gat cag cca tca ttg acc aac ctc aac atc aca ata | 1536 |
| Tyr Lys Pro Pro Asp Gln Pro Ser Leu Thr Asn Leu Asn Ile Thr Ile |      |
| 500 505 510   |      |
| gat acg ggc tat acc gaa gga gac gtg gat cat ggc gtt gtc atg ggc | 1584 |
| Asp Thr Gly Tyr Thr Glu Gly Asp Val Asp His Gly Val Val Met Gly |      |
| 515 520 525   |      |
| gag gga gat ggt acc gtg aac ctc agt aca ggc tac atg tgt aat     | 1632 |
| Glu Gly Asp Gly Thr Val Asn Leu Leu Ser Thr Gly Tyr Met Cys Asn |      |
| 530 535 540   |      |
| cat ggc tgg aat atg aaa cgc tac aac cca gca ggc gtc aag gtt aca | 1680 |
| His Gly Trp Asn Met Lys Arg Tyr Asn Pro Ala Gly Val Lys Val Thr |      |
| 545 550 555 560   |      |
| gtt gtc gag atg cct cac gag ccg gac cgc ttc aat cct cga gga ggg | 1728 |
| Val Val Glu Met Pro His Glu Pro Asp Arg Phe Asn Pro Arg Gly Gly |      |
| 565 570 575   |      |
| cct cgc acg gcc gac cac gtt gac atc ttg ggg cga tac aac ctg aac | 1776 |
| Pro Arg Thr Ala Asp His Val Asp Ile Leu Gly Arg Tyr Asn Leu Asn |      |
| 580 585 590   |      |
| gag ttg ctg tta cga gta gcg agc ggc aaa ggt gac acg att acg aac | 1824 |
| Glu Leu Leu Leu Arg Val Ala Ser Gly Lys Gly Asp Thr Ile Thr Asn |      |
| 595 600 605   |      |
| tat gtt gtg agc aac atc aaa gaa tat gca tcc agg gtt aag att tac | 1872 |
| Tyr Val Val Ser Asn Ile Lys Glu Tyr Ala Ser Arg Val Lys Ile Tyr |      |
| 610 615 620   |      |
| gat gat gag gag act tca tag                                     | 1893 |
| Asp Asp Glu Glu Thr Ser   |      |
| 625 630   |      |

&lt;210&gt; 37

&lt;211&gt; 630

&lt;212&gt; PRT

<213> *Fusarium gramineum*

&lt;400&gt; 37

|   |  |
|---|--|
| Met Gly Lys Ser Thr Leu Arg Arg Arg Asn Gly Gln Asp Ala Thr Asn |  |
| 1 5 10 15   |  |
| Asn Asp Ser Ala Asp Ala Asp Asp Thr Pro Arg Glu Glu Ser Pro Thr |  |
| 20 25 30  |  |
| Ala Glu Pro Thr Thr His Val Arg Val Val Gln His Ala Val Pro Arg |  |
| 35 40 45  |  |
| Thr Arg Lys Arg Arg Asn Thr Phe Val Phe Phe Leu Gly Ser Leu Phe |  |
| 50 55 60  |  |
| Gly Ile Ile Ala Ala Gly Phe Phe Ala Ser Ser Asn Asp Leu Ile Asp |  |
| 65 70 75 80   |  |
| Leu Pro Glu Phe Thr Asp Leu Ser Met Asp Asn Leu Met Asp Val Leu |  |
| 85 90 95  |  |
| Pro Ala Gly Leu Ile Lys Asp Met Arg Asp Leu Val Gln Gly Glu Arg |  |
| 100 105 110   |  |
| Asp Ile Ala Glu Ser Tyr Glu Pro Phe Ser Val Gly Glu Lys Ala Arg |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Ser | Glu | Gly | Leu | Gly | Val | His | His | Pro | Met | Ile | Met | Ile | Pro | Gly | Val |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Ile | Ser | Thr | Gly | Leu | Glu | Ser | Trp | Gly | Thr | Ala | Asn | Ile | Ser | Lys | Pro |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |
| Tyr | Phe | Arg | Lys | Arg | Leu | Trp | Gly | Ser | Trp | Thr | Met | Met | Arg | Ala | Leu |  |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |  |
| Val | Met | Asp | Lys | Glu | Val | Trp | Lys | Lys | His | Val | Met | Leu | Asp | Lys | Arg |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Thr | Gly | Leu | Asp | Pro | Pro | Asp | Val | Lys | Leu | Arg | Ala | Ala | Gln | Gly | Phe |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     | 205 |     |     |     |     |  |
| Asp | Ala | Thr | Asp | Phe | Phe | Ile | Thr | Gly | Tyr | Trp | Ile | Trp | Ser | Lys | Ile |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Phe | Glu | Asn | Leu | Ala | Ser | Ile | Gly | Tyr | Asp | Pro | Thr | Asn | Ser | Phe | Thr |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Ala | Ala | Tyr | Asp | Trp | Arg | Leu | Ser | Tyr | Pro | Asn | Leu | Glu | Val | Arg | Asp |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |  |
| Arg | Tyr | Phe | Thr | Arg | Leu | Lys | Ser | His | Ile | Glu | Ile | Ala | Val | Ala | Thr |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |
| Glu | Asp | Lys | Lys | Val | Val | Leu | Ala | Ser | His | Ser | Met | Gly | Ser | Gln | Val |  |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |  |
| Leu | Tyr | Tyr | Phe | Leu | His | Trp | Val | Gln | Ser | Glu | Arg | Gly | Gly | Arg | Gly |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |
| Gly | Pro | Asp | Trp | Val | Glu | Arg | His | Ile | Asp | Ala | Trp | Ile | Asn | Ile | Ser |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |  |
| Gly | Cys | Met | Leu | Gly | Ala | Val | Lys | Asp | Leu | Thr | Ala | Val | Leu | Ser | Gly |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |  |
| Glu | Met | Arg | Asp | Thr | Ala | Gln | Leu | Asn | Pro | Phe | Ala | Ile | Tyr | Gly | Leu |  |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |  |
| Glu | Lys | Phe | Leu | Ser | Lys | Glu | Glu | Arg | Ala | Glu | Ile | Phe | Arg | Gly | Met |  |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |  |
| Pro | Gly | Ile | Ser | Ser | Met | Leu | Pro | Ile | Gly | Gly | Asn | Ser | Val | Trp | Gly |  |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |  |
| Asn | Leu | Thr | Trp | Ala | Pro | Asp | Asp | Leu | Pro | Gly | Gln | Asn | Arg | Ser | Tyr |  |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |  |
| Gly | Ser | Leu | Leu | Asn | Phe | Arg | Val | Gly | Ser | Asn | Trp | Thr | Thr | Pro | Asp |  |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |  |
| Arg | Asn | Phe | Thr | Val | Glu | Glu | Gly | Val | Ser | Tyr | Leu | Leu | Asn | Thr | Thr |  |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |  |
| Glu | Asp | Trp | Tyr | Gln | Asp | Gln | Ile | Lys | Gly | Ser | Tyr | Ser | Arg | Gly | Ile |  |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |  |
| Ala | His | Ser | Ile | Asp | Glu | Val | Glu | Ala | Asn | Glu | Asn | Asp | Pro | Lys | Lys |  |
|     |     |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |  |
| Trp | Ile | Asn | Pro | Leu | Glu | Thr | Arg | Leu | Pro | Leu | Ala | Pro | Ser | Leu | Lys |  |
| 465 |     |     |     |     | 470 |     |     |     |     |     |     |     |     |     |     |  |

Pro Arg Thr Ala Asp His Val Asp Ile Leu Gly Arg Tyr Asn Leu Asn  
                   580                  585                  590  
 Glu Leu Leu Leu Arg Val Ala Ser Gly Lys Gly Asp Thr Ile Thr Asn  
                   595                  600                  605  
 Tyr Val Val Ser Asn Ile Lys Glu Tyr Ala Ser Arg Val Lys Ile Tyr  
           610                  615                  620  
 Asp Asp Glu Glu Thr Ser  
 625                  630

<210> 38

<211> 849

<212> DNA

<213> Caenorhabditis elegans

<220>

<221> CDS

<222> (1)..(849)

<223> Acyl-CoA:lysophospholipid acyltransferase

<400> 38

|  |     |
|--|-----|
| atg gag aac ttc tgg tcg atc gtc gtg ttt ttt cta ctc tca att ctc    | 48  |
| Met Glu Asn Phe Trp Ser Ile Val Val Phe Phe Leu Leu Ser Ile Leu    |     |
| 1                  5                  10                  15       |     |
| ttc att tta tat aac ata tcg aca gta tgc cac tac tat atg cgg att    | 96  |
| Phe Ile Leu Tyr Asn Ile Ser Thr Val Cys His Tyr Tyr Met Arg Ile    |     |
| 20                  25                  30                         |     |
| tcg ttt tat tac ttc aca att tta ttg cat gga atg gaa gtt tgt gtt    | 144 |
| Ser Phe Tyr Tyr Phe Thr Ile Leu Leu His Gly Met Glu Val Cys Val    |     |
| 35                  40                  45                         |     |
| aca atg atc cct tct tgg cta aat ggg aag ggt gct gat tac gtg ttt    | 192 |
| Thr Met Ile Pro Ser Trp Leu Asn Gly Lys Gly Ala Asp Tyr Val Phe    |     |
| 50                  55                  60                         |     |
| cac tcg ttt ttc tat tgg tgt aaa tgg act ggt gtt cat aca aca gtc    | 240 |
| His Ser Phe Phe Tyr Trp Cys Lys Trp Thr Gly Val His Thr Thr Val    |     |
| 65                  70                  75                  80     |     |
| tat gga tat gaa aaa aca caa gtt gaa ggt ccg gct gta gtt att tgt    | 288 |
| Tyr Gly Tyr Glu Lys Thr Gln Val Glu Gly Pro Ala Val Val Ile Cys    |     |
| 85                  90                  95                         |     |
| aat cat cag agt tct ctc gac att cta tcg atg gca tca atc tgg ccg    | 336 |
| Asn His Gln Ser Ser Leu Asp Ile Leu Ser Met Ala Ser Ile Trp Pro    |     |
| 100                  105                  110                      |     |
| aag aat tgt gtt gta atg atg aaa cga att ctt gcc tat gtt cca ttc    | 384 |
| Lys Asn Cys Val Val Met Met Lys Arg Ile Leu Ala Tyr Val Pro Phe    |     |
| 115                  120                  125                      |     |
| ttc aat ctc gga gcc tac ttt tcc aac aca atc ttc atc gat cga tat    | 432 |
| Phe Asn Leu Gly Ala Tyr Phe Ser Asn Thr Ile Phe Ile Asp Arg Tyr    |     |
| 130                  135                  140                      |     |
| aac cgt gaa cgt gcg atg gct tca gtt gat tat tgt gca tct gaa atg    | 480 |
| Asn Arg Glu Arg Ala Met Ala Ser Val Asp Tyr Cys Ala Ser Glu Met    |     |
| 145                  150                  155                  160 |     |
| aag aac aga aat ctt aaa ctt tgg gta ttt ccg gaa gga aca aga aat    | 528 |
| Lys Asn Arg Asn Leu Lys Leu Trp Val Phe Pro Glu Gly Thr Arg Asn    |     |
| 165                  170                  175                      |     |
| cgt gaa gga ggg ttc att cca ttc aag aaa gga gca ttc aat att gca    | 576 |
| Arg Glu Gly Gly Phe Ile Pro Phe Lys Lys Gly Ala Phe Asn Ile Ala    |     |

|  |     |     |     |     |     |     |
|--|-----|-----|-----|-----|-----|-----|
|  | 180 |     | 185 |     | 190 |     |
| gtt cgt gcg cag att ccc att att cca gtt gta .ttc tca gac tat cgg |     |     |     |     |     | 624 |
| Val Arg Ala Gln Ile Pro Ile Ile Pro Val Val Phe Ser Asp Tyr Arg  |     |     |     |     |     |     |
|  | 195 |     | 200 |     | 205 |     |
| gat ttc tac tca aag cca ggc cga tat ttc aag aat gat gga gaa gtt  |     |     |     |     |     | 672 |
| Asp Phe Tyr Ser Lys Pro Gly Arg Tyr Phe Lys Asn Asp Gly Glu Val  |     |     |     |     |     |     |
|  | 210 |     | 215 |     | 220 |     |
| gtt att cga gtt ctg gat gcg att cca aca aaa ggg ctc act ctt gat  |     |     |     |     |     | 720 |
| Val Ile Arg Val Leu Asp Ala Ile Pro Thr Lys Gly Leu Thr Leu Asp  |     |     |     |     |     |     |
|  | 225 |     | 230 |     | 235 | 240 |
| gac gtc agc gag ttg tct gat atg tgt cgg gac gtt atg ttg gca gcc  |     |     |     |     |     | 768 |
| Asp Val Ser Glu Leu Ser Asp Met Cys Arg Asp Val Met Leu Ala Ala  |     |     |     |     |     |     |
|  |     | 245 |     | 250 |     | 255 |
| tat aag gaa gtt act cta gaa gct cag caa cga aat gcg aca cgg cgt  |     |     |     |     |     | 816 |
| Tyr Lys Glu Val Thr Leu Glu Ala Gln Gln Arg Asn Ala Thr Arg Arg  |     |     |     |     |     |     |
|  | 260 |     | 265 |     | 270 |     |
| gga gaa aca aaa gac ggg aag aaa tct gag taa                      |     |     |     |     |     | 849 |
| Gly Glu Thr Lys Asp Gly Lys Lys Ser Glu                          |     |     |     |     |     |     |
|  | 275 |     | 280 |     |     |     |

&lt;210&gt; 39

&lt;211&gt; 282

&lt;212&gt; PRT

<213> *Caenorhabditis elegans*

&lt;400&gt; 39

|   |  |
|---|--|
| Met Glu Asn Phe Trp Ser Ile Val Val Phe Phe Leu Leu Ser Ile Leu |  |
| 1 5 10 15   |  |
| Phe Ile Leu Tyr Asn Ile Ser Thr Val Cys His Tyr Tyr Met Arg Ile |  |
| 20 25 30  |  |
| Ser Phe Tyr Tyr Phe Thr Ile Leu Leu His Gly Met Glu Val Cys Val |  |
| 35 40 45  |  |
| Thr Met Ile Pro Ser Trp Leu Asn Gly Lys Gly Ala Asp Tyr Val Phe |  |
| 50 55 60  |  |
| His Ser Phe Phe Tyr Trp Cys Lys Trp Thr Gly Val His Thr Thr Val |  |
| 65 70 75 80   |  |
| Tyr Gly Tyr Glu Lys Thr Gln Val Glu Gly Pro Ala Val Val Ile Cys |  |
| 85 90 95  |  |
| Asn His Gln Ser Ser Leu Asp Ile Leu Ser Met Ala Ser Ile Trp Pro |  |
| 100 105 110   |  |
| Lys Asn Cys Val Val Met Met Lys Arg Ile Leu Ala Tyr Val Pro Phe |  |
| 115 120 125   |  |
| Phe Asn Leu Gly Ala Tyr Phe Ser Asn Thr Ile Phe Ile Asp Arg Tyr |  |
| 130 135 140   |  |
| Asn Arg Glu Arg Ala Met Ala Ser Val Asp Tyr Cys Ala Ser Glu Met |  |
| 145 150 155 160   |  |
| Lys Asn Arg Asn Leu Lys Leu Trp Val Phe Pro Glu Gly Thr Arg Asn |  |
| 165 170 175   |  |
| Arg Glu Gly Gly Phe Ile Pro Phe Lys Lys Gly Ala Phe Asn Ile Ala |  |
| 180 185 190   |  |
| Val Arg Ala Gln Ile Pro Ile Ile Pro Val Val Phe Ser Asp Tyr Arg |  |
| 195 200 205   |  |
| Asp Phe Tyr Ser Lys Pro Gly Arg Tyr Phe Lys Asn Asp Gly Glu Val |  |
| 210 215 220   |  |
| Val Ile Arg Val Leu Asp Ala Ile Pro Thr Lys Gly Leu Thr Leu Asp |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|-----|
| 225 |     |     |     |     |     | 230 |     |     |     |     |     | 235 |     |     |     |  |     | 240 |
| Asp | Val | Ser | Glu | Leu | Ser | Asp | Met | Cys | Arg | Asp | Val | Met | Leu | Ala | Ala |  |     |     |
|     |     |     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     |  | 255 |     |
| Tyr | Lys | Glu | Val | Thr | Leu | Glu | Ala | Gln | Gln | Arg | Asn | Ala | Thr | Arg | Arg |  |     |     |
|     |     |     |     |     | 260 |     |     |     |     |     | 265 |     |     |     |     |  | 270 |     |
| Gly | Glu | Thr | Lys | Asp | Gly | Lys | Lys | Ser | Glu |     |     |     |     |     |     |  |     |     |
|     |     |     |     |     | 275 |     |     |     |     |     | 280 |     |     |     |     |  |     |     |

<210> 40

<211> 849

<212> DNA

<213> Caenorhabditis elegans

 $\langle 220 \rangle$ 

<221> CDS

<222> (1) . . (849)

<223> Acyl-CoA:lysophospholipid acyltransferase

<400> 40

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|-----|
| atg | gag | aac | ttc | tgg | tcg | atc | gtc | gtg | ttt | ttt | cta | ctc | tca | att | ctc |  | 48  |
| Met | Glu | Asn | Phe | Trp | Ser | Ile | Val | Val | Phe | Phe | Leu | Leu | Ser | Ile | Leu |  |     |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |  |     |
| ttc | att | tta | tat | aac | ata | tcg | aca | gta | tgc | cac | tac | tat | atg | cgg | att |  | 96  |
| Phe | Ile | Leu | Tyr | Asn | Ile | Ser | Thr | Val | Cys | His | Tyr | Tyr | Met | Arg | Ile |  |     |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |     |
| tcg | ttt | tat | tac | ttc | aca | att | tta | ttg | cat | gga | atg | gaa | ggt | tgt | gtt |  | 144 |
| Ser | Phe | Tyr | Tyr | Phe | Thr | Ile | Leu | Leu | His | Gly | Met | Glu | Val | Cys | Val |  |     |
|     |     | 35  |     |     |     |     | 40  |     |     |     | 45  |     |     |     |     |  |     |
| aca | atg | atc | cct | tct | tgg | cta | aat | ggg | aag | ggt | gct | gat | tac | gtg | ttt |  | 192 |
| Thr | Met | Ile | Pro | Ser | Trp | Leu | Asn | Gly | Lys | Gly | Ala | Asp | Tyr | Val | Phe |  |     |
|     | 50  |     |     |     | 55  |     |     | 60  |     |     |     |     |     |     |     |  |     |
| cac | tcg | ttt | ttc | tat | tgg | tgt | aaa | tgg | act | ggt | ggt | cat | aca | aca | gtc |  | 240 |
| His | Ser | Phe | Phe | Tyr | Trp | Cys | Lys | Trp | Thr | Gly | Val | His | Thr | Thr | Val |  |     |
| 65  |     |     |     | 70  |     |     |     | 75  |     |     |     |     |     | 80  |     |  |     |
| tat | gga | tat | gaa | aaa | aca | caa | ggt | gaa | ggt | ccg | gct | gta | ggt | att | tgt |  | 288 |
| Tyr | Gly | Tyr | Glu | Lys | Thr | Gln | Val | Glu | Gly | Pro | Ala | Val | Val | Ile | Cys |  |     |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |  |     |
| aat | cat | cag | agt | tct | ctc | gac | att | cta | tcg | atg | gca | tca | atc | tgg | ccg |  | 336 |
| Asn | His | Gln | Ser | Ser | Leu | Asp | Ile | Leu | Ser | Met | Ala | Ser | Ile | Trp | Pro |  |     |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     | 110 |     |     |     |  |     |
| aag | aat | tgt | ggt | gta | atg | atg | aaa | cga | att | ctt | gcc | tat | ggt | cca | ttc |  | 384 |
| Lys | Asn | Cys | Val | Val | Met | Met | Lys | Arg | Ile | Leu | Ala | Tyr | Val | Pro | Phe |  |     |
|     |     | 115 |     |     |     |     | 120 |     |     |     | 125 |     |     |     |     |  |     |
| ttc | aat | ctc | gga | gcc | tac | ttt | tcc | aac | aca | atc | ttc | atc | gat | cga | tat |  | 432 |
| Phe | Asn | Leu | Gly | Ala | Tyr | Phe | Ser | Asn | Thr | Ile | Phe | Ile | Asp | Arg | Tyr |  |     |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |     |
| aac | cgt | gaa | cgt | gcg | atg | gct | tca | ggt | gat | tat | tgt | gca | tct | gaa | atg |  | 480 |
| Asn | Arg | Glu | Arg | Ala | Met | Ala | Ser | Val | Asp | Tyr | Cys | Ala | Ser | Glu | Met |  |     |
| 145 |     |     |     | 150 |     |     |     | 155 |     |     |     |     |     | 160 |     |  |     |
| aag | aac | aga | aat | ctt | aaa | ctt | tgg | gta | tct | ccg | gaa | gga | aca | aga | aat |  | 528 |
| Lys | Asn | Arg | Asn | Leu | Lys | Leu | Trp | Val | Ser | Pro | Glu | Gly | Thr | Arg | Asn |  |     |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |     |  |     |
| cgt | gaa | gga | ggg | ttc | att | cca | ttc | aag | aaa | gga | gca | ttc | aat | att | gca |  | 576 |
| Arg | Glu | Gly | Gly | Phe | Ile | Pro | Phe | Lys | Lys | Gly | Ala | Phe | Asn | Ile | Ala |  |     |
|     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |     |
| ggt | cgt | gcg | cag | att | ccc | att | att | cca | ggt | gta | ttc | tca | gac | tat | cgg |  | 624 |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Val | Arg | Ala | Gln | Ile | Pro | Ile | Ile | Pro | Val | Val | Phe | Ser | Asp | Tyr | Arg |     |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |     |
| gat | ttc | tac | tca | aag | cca | ggc | cga | tat | ttc | aag | aat | gat | gga | gaa | gtt | 672 |
| Asp | Phe | Tyr | Ser | Lys | Pro | Gly | Arg | Tyr | Phe | Lys | Asn | Asp | Gly | Glu | Val |     |
|     |     | 210 |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |     |
| gtt | att | cga | gtt | ctg | gat | gcg | att | cca | aca | aaa | ggg | ctc | act | ctt | gat | 720 |
| Val | Ile | Arg | Val | Leu | Asp | Ala | Ile | Pro | Thr | Lys | Gly | Leu | Thr | Leu | Asp |     |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |
| gac | gtc | agc | gag | ttg | tct | gat | atg | tgt | cgg | gac | gtt | atg | ttg | gca | gcc | 768 |
| Asp | Val | Ser | Glu | Leu | Ser | Asp | Met | Cys | Arg | Asp | Val | Met | Leu | Ala | Ala |     |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |     |
| tat | aag | gaa | gtt | act | cta | gaa | gct | cag | caa | cga | aat | gcg | aca | cgg | cgt | 816 |
| Tyr | Lys | Glu | Val | Thr | Leu | Glu | Ala | Gln | Gln | Arg | Asn | Ala | Thr | Arg | Arg |     |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |     |
| gga | gaa | aca | aaa | gac | ggg | aag | aaa | tct | gag | taa |     |     |     |     |     | 849 |
| Gly | Glu | Thr | Lys | Asp | Gly | Lys | Lys | Ser | Glu |     |     |     |     |     |     |     |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     |     |     |     |     |     |

&lt;210&gt; 41

&lt;211&gt; 282

&lt;212&gt; PRT

<213> *Caenorhabditis elegans*

&lt;400&gt; 41

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Glu | Asn | Phe | Trp | Ser | Ile | Val | Val | Phe | Phe | Leu | Leu | Ser | Ile | Leu |  |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |  |
| Phe | Ile | Leu | Tyr | Asn | Ile | Ser | Thr | Val | Cys | His | Tyr | Tyr | Met | Arg | Ile |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Ser | Phe | Tyr | Tyr | Phe | Thr | Ile | Leu | His | Gly | Met | Glu | Val | Cys | Val |     |  |
|     |     | 35  |     |     |     |     | 40  |     |     |     | 45  |     |     |     |     |  |
| Thr | Met | Ile | Pro | Ser | Trp | Leu | Asn | Gly | Lys | Gly | Ala | Asp | Tyr | Val | Phe |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| His | Ser | Phe | Phe | Tyr | Trp | Cys | Lys | Trp | Thr | Gly | Val | His | Thr | Thr | Val |  |
| 65  |     |     |     | 70  |     |     |     |     |     | 75  |     |     |     |     | 80  |  |
| Tyr | Gly | Tyr | Glu | Lys | Thr | Gln | Val | Glu | Gly | Pro | Ala | Val | Val | Ile | Cys |  |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |  |
| Asn | His | Gln | Ser | Ser | Leu | Asp | Ile | Leu | Ser | Met | Ala | Ser | Ile | Trp | Pro |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |
| Lys | Asn | Cys | Val | Val | Met | Met | Lys | Arg | Ile | Leu | Ala | Tyr | Val | Pro | Phe |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Phe | Asn | Leu | Gly | Ala | Tyr | Phe | Ser | Asn | Thr | Ile | Phe | Ile | Asp | Arg | Tyr |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Asn | Arg | Glu | Arg | Ala | Met | Ala | Ser | Val | Asp | Tyr | Cys | Ala | Ser | Glu | Met |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |
| Lys | Asn | Arg | Asn | Leu | Lys | Leu | Trp | Val | Ser | Pro | Glu | Gly | Thr | Arg | Asn |  |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |     |  |
| Arg | Glu | Gly | Gly | Phe | Ile | Pro | Phe | Lys | Gly | Ala | Phe | Asn | Ile | Ala |     |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Val | Arg | Ala | Gln | Ile | Pro | Ile | Ile | Pro | Val | Val | Phe | Ser | Asp | Tyr | Arg |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Asp | Phe | Tyr | Ser | Lys | Pro | Gly | Arg | Tyr | Phe | Lys | Asn | Asp | Gly | Glu | Val |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Val | Ile | Arg | Val | Leu | Asp | Ala | Ile | Pro | Thr | Lys | Gly | Leu | Thr | Leu | Asp |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Asp | Val | Ser | Glu | Leu | Ser | Asp | Met | Cys | Arg | Asp | Val | Met | Leu | Ala | Ala |  |

Tyr Lys Glu Val Thr Leu Glu Ala Gln Gln Arg Asn Ala Thr Arg Arg  
 245 250 255  
 260 265 270  
 Gly Glu Thr Lys Asp Gly Lys Lys Ser Glu  
 275 280

<210> 42

<211> 849

<212> DNA

<213> *Caenorhabditis elegans*

<220>

<221> CDS

<222> (1)..(849)

<223> Acyl-CoA:lysophospholipid acyltransferase

<400> 42

|   |     |
|---|-----|
| atg gag aac ttc tgg tcg atc gtc gtg ttt ttt cta ctc tca att ctc | 48  |
| Met Glu Asn Phe Trp Ser Ile Val Val Phe Phe Leu Leu Ser Ile Leu |     |
| 1 5 10 15   |     |
| ttc att tta tat aac ata tcg aca gta tgc cac tac tat gtg cgg att | 96  |
| Phe Ile Leu Tyr Asn Ile Ser Thr Val Cys His Tyr Tyr Val Arg Ile |     |
| 20 25 30  |     |
| tcg ttt tat tac ttc aca att tta ttg cat gga atg gaa gtt tgt gtt | 144 |
| Ser Phe Tyr Tyr Phe Thr Ile Leu Leu His Gly Met Glu Val Cys Val |     |
| 35 40 45  |     |
| aca atg atc cct tct tgg cta aat ggg aag ggt gct gat tac gtg ttt | 192 |
| Thr Met Ile Pro Ser Trp Leu Asn Gly Lys Gly Ala Asp Tyr Val Phe |     |
| 50 55 60  |     |
| cac tcg ttt ttc tat tgg tgt aaa tgg act ggt gtt cat aca aca gtc | 240 |
| His Ser Phe Phe Tyr Trp Cys Lys Trp Thr Gly Val His Thr Thr Val |     |
| 65 70 75 80   |     |
| tat gga tat gaa aaa aca caa gtt gaa ggt ccg gct gta gtt att tgt | 288 |
| Tyr Gly Tyr Glu Lys Thr Gln Val Glu Gly Pro Ala Val Val Ile Cys |     |
| 85 90 95  |     |
| aat cat cag agt tct ctc gac att cta tcg atg gca tca atc tgg ccg | 336 |
| Asn His Gln Ser Ser Leu Asp Ile Leu Ser Met Ala Ser Ile Trp Pro |     |
| 100 105 110   |     |
| aag aat tgt gtt gta atg atg aaa cga att ctt gcc tat gtt cca ttc | 384 |
| Lys Asn Cys Val Val Met Met Lys Arg Ile Leu Ala Tyr Val Pro Phe |     |
| 115 120 125   |     |
| ttc aat ctc gga gcc tac ttt tcc aac aca atc ttc atc gat cga tat | 432 |
| Phe Asn Leu Gly Ala Tyr Phe Ser Asn Thr Ile Phe Ile Asp Arg Tyr |     |
| 130 135 140   |     |
| aac cgt gaa cgt gcg atg gct tca gtt gat tat tgt gca tct gaa atg | 480 |
| Asn Arg Glu Arg Ala Met Ala Ser Val Asp Tyr Cys Ala Ser Glu Met |     |
| 145 150 155 160   |     |
| aag aac aga aat ctt aaa ctt tgg gta ttt ccg gaa gga aca aga aat | 528 |
| Lys Asn Arg Asn Leu Lys Leu Trp Val Phe Pro Glu Gly Thr Arg Asn |     |
| 165 170 175   |     |
| cgt gaa gga ggg ttc att cca ttc aag aaa gga gca ttc aat att gca | 576 |
| Arg Glu Gly Gly Phe Ile Pro Phe Lys Lys Gly Ala Phe Asn Ile Ala |     |
| 180 185 190   |     |
| gtt cgt gcg cag att ccc att att cca gtt gta ttc tca gac tat cg  | 624 |
| Val Arg Ala Gln Ile Pro Ile Ile Pro Val Val Phe Ser Asp Tyr Arg |     |



|   |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|
|   | 195 |     | 200 |     | 205 |     |
| gat ttc tac tca aag cca ggc cga tat ttc aag aat gat gga gaa gtt |     |     |     |     |     | 672 |
| Asp Phe Tyr Ser Lys Pro Gly Arg Tyr Phe Lys Asn Asp Gly Glu Val |     |     |     |     |     |     |
| 210   |     | 215 |     | 220 |     |     |
| gtt att cga gtt ctg gat gcg att cca aca aaa ggg ctc act ctt gat |     |     |     |     |     | 720 |
| Val Ile Arg Val Leu Asp Ala Ile Pro Thr Lys Gly Leu Thr Leu Asp |     |     |     |     |     |     |
| 225   |     | 230 |     | 235 |     | 240 |
| gac gtc agc gag ttg tct gat atg tgt cgg gac gtt atg ttg gca gcc |     |     |     |     |     | 768 |
| Asp Val Ser Glu Leu Ser Asp Met Cys Arg Asp Val Met Leu Ala Ala |     |     |     |     |     |     |
| 245   |     | 250 |     | 255 |     |     |
| tat aag gaa gtt act cta gaa gct cag caa cga aat gcg aca cgg cgt |     |     |     |     |     | 816 |
| Tyr Lys Glu Val Thr Leu Glu Ala Gln Gln Arg Asn Ala Thr Arg Arg |     |     |     |     |     |     |
| 260   |     | 265 |     | 270 |     |     |
| gga gaa aca aaa gac ggg aag aaa tct gag taa                     |     |     |     |     |     | 849 |
| Gly Glu Thr Lys Asp Gly Lys Lys Ser Glu                         |     |     |     |     |     |     |
| 275   |     | 280 |     |     |     |     |

&lt;210&gt; 43

&lt;211&gt; 282

&lt;212&gt; PRT

<213> *Caenorhabditis elegans*

&lt;400&gt; 43

|   |  |
|---|--|
| Met Glu Asn Phe Trp Ser Ile Val Val Phe Phe Leu Leu Ser Ile Leu |  |
| 1 5 10 15   |  |
| Phe Ile Leu Tyr Asn Ile Ser Thr Val Cys His Tyr Tyr Val Arg Ile |  |
| 20 25 30  |  |
| Ser Phe Tyr Tyr Phe Thr Ile Leu His Gly Met Glu Val Cys Val     |  |
| 35 40 45  |  |
| Thr Met Ile Pro Ser Trp Leu Asn Gly Lys Gly Ala Asp Tyr Val Phe |  |
| 50 55 60  |  |
| His Ser Phe Phe Tyr Trp Cys Lys Trp Thr Gly Val His Thr Thr Val |  |
| 65 70 75 80   |  |
| Tyr Gly Tyr Glu Lys Thr Gln Val Glu Gly Pro Ala Val Val Ile Cys |  |
| 85 90 95  |  |
| Asn His Gln Ser Ser Leu Asp Ile Leu Ser Met Ala Ser Ile Trp Pro |  |
| 100 105 110   |  |
| Lys Asn Cys Val Val Met Met Lys Arg Ile Leu Ala Tyr Val Pro Phe |  |
| 115 120 125   |  |
| Phe Asn Leu Gly Ala Tyr Phe Ser Asn Thr Ile Phe Ile Asp Arg Tyr |  |
| 130 135 140   |  |
| Asn Arg Glu Arg Ala Met Ala Ser Val Asp Tyr Cys Ala Ser Glu Met |  |
| 145 150 155 160   |  |
| Lys Asn Arg Asn Leu Lys Leu Trp Val Phe Pro Glu Gly Thr Arg Asn |  |
| 165 170 175   |  |
| Arg Glu Gly Gly Phe Ile Pro Phe Lys Gly Ala Phe Asn Ile Ala     |  |
| 180 185 190   |  |
| Val Arg Ala Gln Ile Pro Ile Ile Pro Val Val Phe Ser Asp Tyr Arg |  |
| 195 200 205   |  |
| Asp Phe Tyr Ser Lys Pro Gly Arg Tyr Phe Lys Asn Asp Gly Glu Val |  |
| 210 215 220   |  |
| Val Ile Arg Val Leu Asp Ala Ile Pro Thr Lys Gly Leu Thr Leu Asp |  |
| 225 230 235 240   |  |
| Asp Val Ser Glu Leu Ser Asp Met Cys Arg Asp Val Met Leu Ala Ala |  |
| 245 250 255   |  |

Tyr Lys Glu Val Thr Leu Glu Ala Gln Gln Arg Asn Ala Thr Arg Arg  
                   260                  265                  270  
 Gly Glu Thr Lys Asp Gly Lys Lys Ser Glu  
                   275                  280

<210> 44

<211> 849

<212> DNA

<213> *Caenorhabditis elegans*

<220>

<221> CDS

<222> (1)..(849)

<223> Acyl-CoA:lysophospholipid acyltransferase

<400> 44

|  |     |
|--|-----|
| atg gag aac ttc tgg tcg atc gtc gtg ttt ttt cta ctc tca att ctc    | 48  |
| Met Glu Asn Phe Trp Ser Ile Val Val Phe Phe Leu Leu Ser Ile Leu    |     |
| 1                  5                  10                  15       |     |
| ttc att tta tat aac ata tcg aca gta tgc cac tac tat atg cgg att    | 96  |
| Phe Ile Leu Tyr Asn Ile Ser Thr Val Cys His Tyr Tyr Met Arg Ile    |     |
| 20                  25                  30                         |     |
| tcg ttt tat tac ttc aca att tta ttg cat gga atg gaa gtt tgt gtt    | 144 |
| Ser Phe Tyr Tyr Phe Thr Ile Leu Leu His Gly Met Glu Val Cys Val    |     |
| 35                  40                  45                         |     |
| aca atg atc cct tct tgg cta aat ggg aag ggt gct gat tac gtg ttt    | 192 |
| Thr Met Ile Pro Ser Trp Leu Asn Gly Lys Gly Ala Asp Tyr Val Phe    |     |
| 50                  55                  60                         |     |
| cac tcg ttt ttc tat tgg tgt aaa tgg act ggt gtt cat aca aca gtc    | 240 |
| His Ser Phe Phe Tyr Trp Cys Lys Trp Thr Gly Val His Thr Thr Val    |     |
| 65                  70                  75                  80     |     |
| tat gga tat gaa aaa aca caa gtt gaa ggt ccg gcc gta gtt att tgt    | 288 |
| Tyr Gly Tyr Glu Lys Thr Gln Val Glu Gly Pro Ala Val Val Ile Cys    |     |
| 85                  90                  95                         |     |
| aat cat cag ggt tct ctc gac att cta tcg atg gca tca atc tgg ccg    | 336 |
| Asn His Gln Gly Ser Leu Asp Ile Leu Ser Met Ala Ser Ile Trp Pro    |     |
| 100                  105                  110                      |     |
| aag aat tgt gtt gta atg atg aaa cga att ctt gcc tat gtt cca ttc    | 384 |
| Lys Asn Cys Val Val Met Met Lys Arg Ile Leu Ala Tyr Val Pro Phe    |     |
| 115                  120                  125                      |     |
| ttc aat ctc gga gcc tac ttt tcc aac aca atc ttc atc gat cga tat    | 432 |
| Phe Asn Leu Gly Ala Tyr Phe Ser Asn Thr Ile Phe Ile Asp Arg Tyr    |     |
| 130                  135                  140                      |     |
| aac cgt gaa cgt gcg atg gct tca gtt gat tat tgt gca tct gaa atg    | 480 |
| Asn Arg Glu Arg Ala Met Ala Ser Val Asp Tyr Cys Ala Ser Glu Met    |     |
| 145                  150                  155                  160 |     |
| aag aac aga aat ctt aaa ctt tgg gta ttt ccg gaa gga aca aga aat    | 528 |
| Lys Asn Arg Asn Leu Lys Leu Trp Val Phe Pro Glu Gly Thr Arg Asn    |     |
| 165                  170                  175                      |     |
| cgt gaa gga ggg ttc att cca ttc aag aaa gga gca ttc aat att gca    | 576 |
| Arg Glu Gly Gly Phe Ile Pro Phe Lys Lys Gly Ala Phe Asn Ile Ala    |     |
| 180                  185                  190                      |     |
| gtt cgt gcg cag att ccc att att cca gtt gta ttc tca gac tat cgg    | 624 |
| Val Arg Ala Gln Ile Pro Ile Ile Pro Val Val Phe Ser Asp Tyr Arg    |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gat | ttc | tac | tca | aag | cca | ggc | cga | tat | ttc | aag | aat | gat | gga | gaa | gtt | 672 |
| Asp | Phe | Tyr | Ser | Lys | Pro | Gly | Arg | Tyr | Phe | Lys | Asn | Asp | Gly | Glu | Val |     |
| 210 |     |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |     |
| gtt | att | cga | gtt | ctg | gat | gcg | att | cca | aca | aaa | ggg | ctc | act | ctt | gat | 720 |
| Val | Ile | Arg | Val | Leu | Asp | Ala | Ile | Pro | Thr | Lys | Gly | Leu | Thr | Leu | Asp |     |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |     |
| gac | gtc | agc | gag | ttg | tct | gat | atg | tgt | cgg | gac | gtt | atg | ttg | gca | gcc | 768 |
| Asp | Val | Ser | Glu | Leu | Ser | Asp | Met | Cys | Arg | Asp | Val | Met | Leu | Ala | Ala |     |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |     |
| tat | aag | gaa | gtt | act | cta | gaa | gct | cag | caa | cga | aat | gcg | aca | cgg | cgt | 816 |
| Tyr | Lys | Glu | Val | Thr | Leu | Glu | Ala | Gln | Arg | Asn | Ala | Thr | Arg | Arg |     |     |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     | 270 |     |     |     |     |
| gga | gaa | aca | aaa | gac | ggg | aag | aaa | tct | gag | taa |     |     |     |     |     | 849 |
| Gly | Glu | Thr | Lys | Asp | Gly | Lys | Lys | Ser | Glu |     |     |     |     |     |     |     |
| 275 |     |     |     |     |     | 280 |     |     |     |     |     |     |     |     |     |     |

&lt;210&gt; 45

&lt;211&gt; 282

&lt;212&gt; PRT

<213> *Caenorhabditis elegans*

&lt;400&gt; 45

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Glu | Asn | Phe | Trp | Ser | Ile | Val | Val | Phe | Phe | Leu | Leu | Ser | Ile | Leu |  |
| 1   |     |     | 5   |     |     |     |     |     | 10  |     |     |     |     | 15  |     |  |
| Phe | Ile | Leu | Tyr | Asn | Ile | Ser | Thr | Val | Cys | His | Tyr | Tyr | Met | Arg | Ile |  |
|     |     | 20  |     |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Ser | Phe | Tyr | Tyr | Phe | Thr | Ile | Leu | His | Gly | Met | Glu | Val | Cys | Val |     |  |
|     | 35  |     |     |     |     |     | 40  |     |     |     | 45  |     |     |     |     |  |
| Thr | Met | Ile | Pro | Ser | Trp | Leu | Asn | Gly | Lys | Gly | Ala | Asp | Tyr | Val | Phe |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |
| His | Ser | Phe | Phe | Tyr | Trp | Cys | Lys | Trp | Thr | Gly | Val | His | Thr | Thr | Val |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |
| Tyr | Gly | Tyr | Glu | Lys | Thr | Gln | Val | Glu | Gly | Pro | Ala | Val | Val | Ile | Cys |  |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |  |
| Asn | His | Gln | Gly | Ser | Leu | Asp | Ile | Leu | Ser | Met | Ala | Ser | Ile | Trp | Pro |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |
| Lys | Asn | Cys | Val | Val | Met | Met | Lys | Arg | Ile | Leu | Ala | Tyr | Val | Pro | Phe |  |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |
| Phe | Asn | Leu | Gly | Ala | Tyr | Phe | Ser | Asn | Thr | Ile | Phe | Ile | Asp | Arg | Tyr |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Asn | Arg | Glu | Arg | Ala | Met | Ala | Ser | Val | Asp | Tyr | Cys | Ala | Ser | Glu | Met |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |
| Lys | Asn | Arg | Asn | Leu | Lys | Leu | Trp | Val | Phe | Pro | Glu | Gly | Thr | Arg | Asn |  |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |  |
| Arg | Glu | Gly | Gly | Phe | Ile | Pro | Phe | Lys | Gly | Ala | Phe | Asn | Ile | Ala |     |  |
|     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Val | Arg | Ala | Gln | Ile | Pro | Ile | Ile | Pro | Val | Val | Phe | Ser | Asp | Tyr | Arg |  |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |  |
| Asp | Phe | Tyr | Ser | Lys | Pro | Gly | Arg | Tyr | Phe | Lys | Asn | Asp | Gly | Glu | Val |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |
| Val | Ile | Arg | Val | Leu | Asp | Ala | Ile | Pro | Thr | Lys | Gly | Leu | Thr | Leu | Asp |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |
| Asp | Val | Ser | Glu | Leu | Ser | Asp | Met | Cys | Arg | Asp | Val | Met | Leu | Ala | Ala |  |
|     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |     |  |

Tyr Lys Glu Val Thr Leu Glu Ala Gln Gln Arg Asn Ala Thr Arg Arg  
 260 265 270  
 Gly Glu Thr Lys Asp Gly Lys Lys Ser Glu  
 275 280

<210> 46

<211> 1578

<212> DNA

<213> *Physcomitrella patens*

<220>

<221> CDS

<222> (1)..(1578)

<223> Delta-6-desaturase

<400> 46

|   |     |
|---|-----|
| atg gta ttc gcg ggc ggt gga ctt cag cag ggc tct ctc gaa gaa aac | 48  |
| Met Val Phe Ala Gly Gly Gly Leu Gln Gln Gly Ser Leu Glu Glu Asn |     |
| 1 5 10 15   |     |
| atc gac gtc gag cac att gcc agt atg tct ctc ttc agc gac ttc ttc | 96  |
| Ile Asp Val Glu His Ile Ala Ser Met Ser Leu Phe Ser Asp Phe Phe |     |
| 20 25 30  |     |
| agt tat gtg tct tca act gtt ggt tcg tgg agc gta cac agt ata caa | 144 |
| Ser Tyr Val Ser Ser Thr Val Gly Ser Trp Ser Val His Ser Ile Gln |     |
| 35 40 45  |     |
| cct ttg aag cgc ctg acg agt aag aag cgt gtt tcg gaa agc gct gcc | 192 |
| Pro Leu Lys Arg Leu Thr Ser Lys Lys Arg Val Ser Glu Ser Ala Ala |     |
| 50 55 60  |     |
| gtg caa tgt ata tca gct gaa gtt cag aga aat tcg agt acc cag gga | 240 |
| Val Gln Cys Ile Ser Ala Glu Val Gln Arg Asn Ser Ser Thr Gln Gly |     |
| 65 70 75 80   |     |
| act gcg gag gca ctc gca gaa tca gtc gtg aag ccc acg aga cga agg | 288 |
| Thr Ala Glu Ala Leu Ala Glu Ser Val Val Lys Pro Thr Arg Arg Arg |     |
| 85 90 95  |     |
| tca tct cag tgg aag aag tcg aca cac ccc cta tca gaa gta gca gta | 336 |
| Ser Ser Gln Trp Lys Lys Ser Thr His Pro Leu Ser Glu Val Ala Val |     |
| 100 105 110   |     |
| cac aac aag cca agc gat tgc tgg att gtt gta aaa aac aag gtg tat | 384 |
| His Asn Lys Pro Ser Asp Cys Trp Ile Val Val Lys Asn Lys Val Tyr |     |
| 115 120 125   |     |
| gat gtt tcc aat ttt gcg gac gag cat ccc gga gga tca gtt att agt | 432 |
| Asp Val Ser Asn Phe Ala Asp Glu His Pro Gly Gly Ser Val Ile Ser |     |
| 130 135 140   |     |
| act tat ttt gga cga gac ggc aca gat gtt ttc tct agt ttt cat gca | 480 |
| Thr Tyr Phe Gly Arg Asp Gly Thr Asp Val Phe Ser Ser Phe His Ala |     |
| 145 150 155 160   |     |
| gct tct aca tgg aaa att ctt caa gac ttt tac att ggt gac gtg gag | 528 |
| Ala Ser Thr Trp Lys Ile Leu Gln Asp Phe Tyr Ile Gly Asp Val Glu |     |
| 165 170 175   |     |
| agg gtg gag ccg act cca gag ctg ctg aaa gat ttc cga gaa atg aga | 576 |
| Arg Val Glu Pro Thr Pro Glu Leu Leu Lys Asp Phe Arg Glu Met Arg |     |
| 180 185 190   |     |
| gct ctt ttc ctg agg gag caa ctt ttc aaa agt tcg aaa ttg tac tat | 624 |
| Ala Leu Phe Leu Arg Glu Gln Leu Phe Lys Ser Ser Lys Leu Tyr Tyr |     |
| 195 200 205   |     |

|   |      |
|---|------|
| gtt atg aag ctg ctc acg aat gtt gct att ttt gct gcg agc att gca | 672  |
| Val Met Lys Leu Leu Thr Asn Val Ala Ile Phe Ala Ala Ser Ile Ala |      |
| 210 215 220   |      |
| ata ata tgt tgg agc aag act att tca gcg gtt ttg gct tca gct tgt | 720  |
| Ile Ile Cys Trp Ser Lys Thr Ile Ser Ala Val Leu Ala Ser Ala Cys |      |
| 225 230 235 240   |      |
| atg atg gct ctg tgt ttc caa cag tgc gga tgg cta tcc cat gat ttt | 768  |
| Met Met Ala Leu Cys Phe Gln Gln Cys Gly Trp Leu Ser His Asp Phe |      |
| 245 250 255   |      |
| ctc cac aat cag gtg ttt gag aca cgc tgg ctt aat gaa gtt gtc ggg | 816  |
| Leu His Asn Gln Val Phe Glu Thr Arg Trp Leu Asn Glu Val Val Gly |      |
| 260 265 270   |      |
| tat gtg atc ggc aac gcc gtt ctg ggg ttt agt aca ggg tgg tgg aag | 864  |
| Tyr Val Ile Gly Asn Ala Val Leu Gly Phe Ser Thr Gly Trp Trp Lys |      |
| 275 280 285   |      |
| gag aag cat aac ctt cat cat gct gct cca aat gaa tgc gat cag act | 912  |
| Glu Lys His Asn Leu His His Ala Ala Pro Asn Glu Cys Asp Gln Thr |      |
| 290 295 300   |      |
| tac caa cca att gat gaa gat att gat act ctc ccc ctc att gcc tgg | 960  |
| Tyr Gln Pro Ile Asp Glu Asp Ile Asp Thr Leu Pro Leu Ile Ala Trp |      |
| 305 310 315 320   |      |
| agc aag gac ata ctg gcc aca gtt gag aat aag aca ttc ttg cga atc | 1008 |
| Ser Lys Asp Ile Leu Ala Thr Val Glu Asn Lys Thr Phe Leu Arg Ile |      |
| 325 330 335   |      |
| ctc caa tac cag cat ctg ttc ttc atg ggt ctg tta ttt ttc gcc cgt | 1056 |
| Leu Gln Tyr Gln His Leu Phe Phe Met Gly Leu Leu Phe Phe Ala Arg |      |
| 340 345 350   |      |
| ggg agt tgg ctc ttt tgg agc tgg aga tat acc tct aca gca gtg ctc | 1104 |
| Gly Ser Trp Leu Phe Trp Ser Trp Arg Tyr Thr Ser Thr Ala Val Leu |      |
| 355 360 365   |      |
| tca cct gtc gac agg ttg ttg gag aag gga act gtt ctg ttt cac tac | 1152 |
| Ser Pro Val Asp Arg Leu Leu Glu Lys Gly Thr Val Leu Phe His Tyr |      |
| 370 375 380   |      |
| ttt tgg ttc gtc ggg aca gcg tgc tat ctt ctc cct ggt tgg aag cca | 1200 |
| Phe Trp Phe Val Gly Thr Ala Cys Tyr Leu Leu Pro Gly Trp Lys Pro |      |
| 385 390 395 400   |      |
| tta gta tgg atg gcg gtg act gag ctc atg tcc ggc atg ctg ctg ggc | 1248 |
| Leu Val Trp Met Ala Val Thr Glu Leu Met Ser Gly Met Leu Leu Gly |      |
| 405 410 415   |      |
| ttt gta ttt gta ctt agc cac aat ggg atg gag gtt tat aat tcg tct | 1296 |
| Phe Val Phe Val Leu Ser His Asn Gly Met Glu Val Tyr Asn Ser Ser |      |
| 420 425 430   |      |
| aaa gaa ttc gtg agt gca cag atc gta tcc aca cgg gat atc aaa gga | 1344 |
| Lys Glu Phe Val Ser Ala Gln Ile Val Ser Thr Arg Asp Ile Lys Gly |      |
| 435 440 445   |      |
| aac ata ttc aac gac tgg ttc act ggt ggc ctt aac agg caa ata gag | 1392 |
| Asn Ile Phe Asn Asp Trp Phe Thr Gly Gly Leu Asn Arg Gln Ile Glu |      |
| 450 455 460   |      |
| cat cat ctt ttc cca aca atg ccc agg cat aat tta aac aaa ata gca | 1440 |
| His His Leu Phe Pro Thr Met Pro Arg His Asn Leu Asn Lys Ile Ala |      |
| 465 470 475 480   |      |
| cct aga gtg gag gtg ttc tgt aag aaa cac ggt ctg gtg tac gaa gac | 1488 |
| Pro Arg Val Glu Val Phe Cys Lys Lys His Gly Leu Val Tyr Glu Asp |      |
| 485 490 495   |      |
| gta tct att gct acc ggc act tgc aag gtt ttg aaa gca ttg aag gaa | 1536 |
| Val Ser Ile Ala Thr Gly Thr Cys Lys Val Leu Lys Ala Leu Lys Glu |      |
| 500 505 510   |      |

gtc gcg gag gct gcg gca gag cag cat gct acc acc agt taa  
 Val Ala Glu Ala Ala Ala Glu Gln His Ala Thr Thr Ser  
           515                          520                          525

1578

&lt;210&gt; 47

&lt;211&gt; 525

&lt;212&gt; PRT

&lt;213&gt; Physcomitrella patens

&lt;400&gt; 47

Met Val Phe Ala Gly Gly Gly Leu Gln Gln Gly Ser Leu Glu Glu Asn  
 1                  5                          10                          15  
 Ile Asp Val Glu His Ile Ala Ser Met Ser Leu Phe Ser Asp Phe Phe  
                   20                          25                          30  
 Ser Tyr Val Ser Ser Thr Val Gly Ser Trp Ser Val His Ser Ile Gln  
                   35                          40                          45  
 Pro Leu Lys Arg Leu Thr Ser Lys Lys Arg Val Ser Glu Ser Ala Ala  
                   50                          55                          60  
 Val Gln Cys Ile Ser Ala Glu Val Gln Arg Asn Ser Ser Thr Gln Gly  
 65                          70                          75                          80  
 Thr Ala Glu Ala Leu Ala Glu Ser Val Val Lys Pro Thr Arg Arg Arg  
                           85                          90                          95  
 Ser Ser Gln Trp Lys Lys Ser Thr His Pro Leu Ser Glu Val Ala Val  
                   100                          105                          110  
 His Asn Lys Pro Ser Asp Cys Trp Ile Val Val Lys Asn Lys Val Tyr  
                   115                          120                          125  
 Asp Val Ser Asn Phe Ala Asp Glu His Pro Gly Gly Ser Val Ile Ser  
                   130                          135                          140  
 Thr Tyr Phe Gly Arg Asp Gly Thr Asp Val Phe Ser Ser Phe His Ala  
 145                          150                          155                          160  
 Ala Ser Thr Trp Lys Ile Leu Gln Asp Phe Tyr Ile Gly Asp Val Glu  
                   165                          170                          175  
 Arg Val Glu Pro Thr Pro Glu Leu Leu Lys Asp Phe Arg Glu Met Arg  
                   180                          185                          190  
 Ala Leu Phe Leu Arg Glu Gln Leu Phe Lys Ser Ser Lys Leu Tyr Tyr  
                   195                          200                          205  
 Val Met Lys Leu Leu Thr Asn Val Ala Ile Phe Ala Ala Ser Ile Ala  
                   210                          215                          220  
 Ile Ile Cys Trp Ser Lys Thr Ile Ser Ala Val Leu Ala Ser Ala Cys  
 225                          230                          235                          240  
 Met Met Ala Leu Cys Phe Gln Gln Cys Gly Trp Leu Ser His Asp Phe  
                   245                          250                          255  
 Leu His Asn Gln Val Phe Glu Thr Arg Trp Leu Asn Glu Val Val Gly  
                   260                          265                          270  
 Tyr Val Ile Gly Asn Ala Val Leu Gly Phe Ser Thr Gly Trp Trp Lys  
                   275                          280                          285  
 Glu Lys His Asn Leu His His Ala Ala Pro Asn Glu Cys Asp Gln Thr  
                   290                          295                          300  
 Tyr Gln Pro Ile Asp Glu Asp Ile Asp Thr Leu Pro Leu Ile Ala Trp  
 305                          310                          315                          320  
 Ser Lys Asp Ile Leu Ala Thr Val Glu Asn Lys Thr Phe Leu Arg Ile  
                   325                          330                          335  
 Leu Gln Tyr Gln His Leu Phe Phe Met Gly Leu Leu Phe Phe Ala Arg  
                   340                          345                          350  
 Gly Ser Trp Leu Phe Trp Ser Trp Arg Tyr Thr Ser Thr Ala Val Leu

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Ser | Pro | Val | Asp | Arg | Leu | Leu | Glu | Lys | Gly | Thr | Val | Leu | Phe | His | Tyr |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Phe | Trp | Phe | Val | Gly | Thr | Ala | Cys | Tyr | Leu | Leu | Pro | Gly | Trp | Lys | Pro |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Leu | Val | Trp | Met | Ala | Val | Thr | Glu | Leu | Met | Ser | Gly | Met | Leu | Leu | Gly |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Phe | Val | Phe | Val | Leu | Ser | His | Asn | Gly | Met | Glu | Val | Tyr | Asn | Ser | Ser |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Lys | Glu | Phe | Val | Ser | Ala | Gln | Ile | Val | Ser | Thr | Arg | Asp | Ile | Lys | Gly |
|     |     | 435 |     |     |     | 440 |     |     |     |     |     | 445 |     |     |     |
| Asn | Ile | Phe | Asn | Asp | Trp | Phe | Thr | Gly | Gly | Leu | Asn | Arg | Gln | Ile | Glu |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| His | His | Leu | Phe | Pro | Thr | Met | Pro | Arg | His | Asn | Leu | Asn | Lys | Ile | Ala |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Pro | Arg | Val | Glu | Val | Phe | Cys | Lys | Lys | His | Gly | Leu | Val | Tyr | Glu | Asp |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Val | Ser | Ile | Ala | Thr | Gly | Thr | Cys | Lys | Val | Leu | Lys | Ala | Leu | Lys | Glu |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Val | Ala | Glu | Ala | Ala | Ala | Glu | Gln | His | Ala | Thr | Thr | Ser |     |     |     |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |

<210> 48

<211> 1192

<212> DNA

<213> Physcomitrella patens

 $\langle 220 \rangle$ 

<221> CDS

<222> (58) .. (930)

<223> Delta-6-elongase

<400> 48

|             |             |             |             |             |         |     |
|-------------|-------------|-------------|-------------|-------------|---------|-----|
| ctgcttcgtc  | tcatcttggg  | ggtgtgattc  | gggagtggg   | tgagttgg    | gagcgca | 57  |
| atg gag gtc | gtg gag aga | ttc tac ggt | gag ttg gat | ggg aag gtc | tcg     | 105 |
| Met Glu Val | Val Glu Arg | Phe Tyr Gly | Glu Leu Asp | Gly Lys Val | Ser     |     |
| 1           | 5           | 10          | 15          |             |         |     |
| cag ggc     | gtg aat gca | ttg ctg ggt | agt ttt ggg | gtg gag ttg | acg gat | 153 |
| Gln Gly Val | Asn Ala Leu | Leu Gly Ser | Phe Gly Val | Glu Leu Thr | Asp     |     |
|             | 20          | 25          | 30          |             |         |     |
| acg ccc     | act acc aaa | ggc ttg ccc | ctc gtt gac | agt ccc aca | ccc atc | 201 |
| Thr Pro Thr | Thr Lys Gly | Leu Pro Leu | Val Asp Ser | Pro Thr Pro | Ile     |     |
|             | 35          | 40          | 45          |             |         |     |
| gtc ctc     | ggt gtt tct | gta tac ttg | act att gtc | att gga ggg | ctt ttg | 249 |
| Val Leu Gly | Val Ser Val | Tyr Leu Thr | Ile Val Ile | Gly Gly Leu | Leu     |     |
|             | 50          | 55          | 60          |             |         |     |
| tgg ata     | aag gcc agg | gat ctg aaa | ccg cgc gcc | tcg gag cca | ttt ttg | 297 |
| Trp Ile Lys | Ala Arg Asp | Leu Lys Pro | Arg Ala Ser | Glu Pro Phe | Leu     |     |
| 65          | 70          | 75          | 80          |             |         |     |
| ctc caa     | gct ttg gtg | ctt gtg cac | aac ctg ttc | tgt ttt gcg | ctc agt | 345 |
| Leu Gln Ala | Leu Val Leu | Val His Asn | Leu Phe Cys | Phe Ala Leu | Ser     |     |
|             | 85          | 90          | 95          |             |         |     |
| ctg tat     | atg tgc gtg | ggc atc gct | tat cag gct | att acc tgg | cgg tac | 393 |
| Leu Tyr Met | Cys Val Gly | Ile Ala Tyr | Gln Ala Ile | Thr Trp Arg | Tyr     |     |
|             | 100         | 105         | 110         |             |         |     |

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tct ctc tgg ggc aat gca tac aat cct aaa cat aaa gag atg gcg att      441
Ser Leu Trp Gly Asn Ala Tyr Asn Pro Lys His Lys Glu Met Ala Ile
      115                      120                      125
ctg gta tac ttg ttc tac atg tct aag tac gtg gaa ttc atg gat acc      489
Leu Val Tyr Leu Phe Tyr Met Ser Lys Tyr Val Glu Phe Met Asp Thr
      130                      135                      140
gtt atc atg ata ctg aag cgc agc acc agg caa ata agc ttc ctc cac      537
Val Ile Met Ile Leu Lys Arg Ser Thr Arg Gln Ile Ser Phe Leu His
      145                      150                      155                      160
gtt tat cat cat tct tca att tcc ctc att tgg tgg gct att gct cat      585
Val Tyr His His Ser Ser Ile Ser Leu Ile Trp Trp Ala Ile Ala His
      165                      170                      175
cac gct cct ggc ggt gaa gca tat tgg tct gcg gct ctg aac tca gga      633
His Ala Pro Gly Glu Ala Tyr Trp Ser Ala Ala Leu Asn Ser Gly
      180                      185                      190
gtg cat gtt ctc atg tat gcg tat tac ttc ttg gct gcc tgc ctt cga      681
Val His Val Leu Met Tyr Ala Tyr Tyr Phe Leu Ala Ala Cys Leu Arg
      195                      200                      205
agt agc cca aag tta aaa aat aag tac ctt ttt tgg ggc agg tac ttg      729
Ser Ser Pro Lys Leu Lys Asn Lys Tyr Leu Phe Trp Gly Arg Tyr Leu
      210                      215                      220
aca caa ttc caa atg ttc cag ttt atg ctg aac tta gtg cag gct tac      777
Thr Gln Phe Gln Met Phe Gln Phe Met Leu Asn Leu Val Gln Ala Tyr
      225                      230                      235                      240
tac gac atg aaa acg aat gcg cca tat cca caa tgg ctg atc aag att      825
Tyr Asp Met Lys Thr Asn Ala Pro Tyr Pro Gln Trp Leu Ile Lys Ile
      245                      250                      255
ttg ttc tac tac atg atc tcg ttg ctg ttt ctt ttc ggc aat ttt tac      873
Leu Phe Tyr Tyr Met Ile Ser Leu Leu Phe Leu Phe Gly Asn Phe Tyr
      260                      265                      270
gta caa aaa tac atc aaa ccc tct gac gga aag caa aag gga gct aaa      921
Val Gln Lys Tyr Ile Lys Pro Ser Asp Gly Lys Gln Lys Gly Ala Lys
      275                      280                      285
act gag tga gctgtatcaa gccatagaaa ctctattatg ttagaacctg      970
Thr Glu
      290
aagttggtgc tttcttatct ccacttatct ttttaagcagc atcagttttg aaatgatgtg      1030
tgggcggtgt ctgcaagtag tcatcaatat aatcggcctg agcacttcag atggattgtt      1090
agaacatgag taaaagcggg tattacgggtg tttattttgt accaaatcac cgcacgggtg      1150
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<210> 49

<211> 290

<212> PRT

<213> Physcomitrella patens

<400> 49

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Met Glu Val Val Glu Arg Phe Tyr Gly Glu Leu Asp Gly Lys Val Ser
1                      5                      10                      15
Gln Gly Val Asn Ala Leu Leu Gly Ser Phe Gly Val Glu Leu Thr Asp
      20                      25                      30
Thr Pro Thr Thr Lys Gly Leu Pro Leu Val Asp Ser Pro Thr Pro Ile
      35                      40                      45
Val Leu Gly Val Ser Val Tyr Leu Thr Ile Val Ile Gly Gly Leu Leu
      50                      55                      60

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Trp Ile Lys Ala Arg Asp Leu Lys Pro Arg Ala Ser Glu Pro Phe Leu  
 65 70 75 80  
 Leu Gln Ala Leu Val Leu Val His Asn Leu Phe Cys Phe Ala Leu Ser  
 85 90 95  
 Leu Tyr Met Cys Val Gly Ile Ala Tyr Gln Ala Ile Thr Trp Arg Tyr  
 100 105 110  
 Ser Leu Trp Gly Asn Ala Tyr Asn Pro Lys His Lys Glu Met Ala Ile  
 115 120 125  
 Leu Val Tyr Leu Phe Tyr Met Ser Lys Tyr Val Glu Phe Met Asp Thr  
 130 135 140  
 Val Ile Met Ile Leu Lys Arg Ser Thr Arg Gln Ile Ser Phe Leu His  
 145 150 155 160  
 Val Tyr His His Ser Ser Ile Ser Leu Ile Trp Trp Ala Ile Ala His  
 165 170 175  
 His Ala Pro Gly Gly Glu Ala Tyr Trp Ser Ala Ala Leu Asn Ser Gly  
 180 185 190  
 Val His Val Leu Met Tyr Ala Tyr Tyr Phe Leu Ala Ala Cys Leu Arg  
 195 200 205  
 Ser Ser Pro Lys Leu Lys Asn Lys Tyr Leu Phe Trp Gly Arg Tyr Leu  
 210 215 220  
 Thr Gln Phe Gln Met Phe Gln Phe Met Leu Asn Leu Val Gln Ala Tyr  
 225 230 235 240  
 Tyr Asp Met Lys Thr Asn Ala Pro Tyr Pro Gln Trp Leu Ile Lys Ile  
 245 250 255  
 Leu Phe Tyr Tyr Met Ile Ser Leu Leu Phe Leu Phe Gly Asn Phe Tyr  
 260 265 270  
 Val Gln Lys Tyr Ile Lys Pro Ser Asp Gly Lys Gln Lys Gly Ala Lys  
 275 280 285  
 Thr Glu  
 290

<210> 50

<211> 1410

<212> DNA

<213> *Phaeodactylum tricornutum*

<220>

<221> CDS

<222> (1)..(1410)

<223> Delta-5-desaturase

<400> 50

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| atg gct ccg gat gcg gat aag ctt cga caa cgc cag acg act gcg gta | 48  |
| Met Ala Pro Asp Ala Asp Lys Leu Arg Gln Arg Gln Thr Thr Ala Val |     |
| 1 5 10 15   |     |
| gcg aag cac aat gct gct acc ata tcg acg cag gaa cgc ctt tgc agt | 96  |
| Ala Lys His Asn Ala Ala Thr Ile Ser Thr Gln Glu Arg Leu Cys Ser |     |
| 20 25 30  |     |
| ctg tct tcg ctc aaa ggc gaa gaa gtc tgc atc gac gga atc atc tat | 144 |
| Leu Ser Ser Leu Lys Gly Glu Glu Val Cys Ile Asp Gly Ile Ile Tyr |     |
| 35 40 45  |     |
| gac ctc caa tca ttc gat cat ccc ggg ggt gaa acg atc aaa atg ttt | 192 |
| Asp Leu Gln Ser Phe Asp His Pro Gly Gly Glu Thr Ile Lys Met Phe |     |
| 50 55 60  |     |
| ggg ggc aac gat gtc act gta cag tac aag atg att cac ccg tac cat | 240 |

|           |     |     |     |     |           |     |     |     |     |           |     |     |     |     |           |      |
|-----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|-----------|------|
| Gly<br>65 | Gly | Asn | Asp | Val | Thr<br>70 | Val | Gln | Tyr | Lys | Met<br>75 | Ile | His | Pro | Tyr | His<br>80 |      |
| acc       | gag | aag | cat | ttg | gaa       | aag | atg | aag | cgt | gtc       | ggc | aag | gtg | acg | gat       | 288  |
| Thr       | Glu | Lys | His | Leu | Glu       | Lys | Met | Lys | Arg | Val       | Gly | Lys | Val | Thr | Asp       |      |
|           |     |     |     | 85  |           |     |     |     | 90  |           |     |     |     | 95  |           |      |
| ttc       | gtc | tgc | gag | tac | aag       | ttc | gat | acc | gaa | ttt       | gaa | cgc | gaa | atc | aaa       | 336  |
| Phe       | Val | Cys | Glu | Tyr | Lys       | Phe | Asp | Thr | Glu | Phe       | Glu | Arg | Glu | Ile | Lys       |      |
|           |     |     | 100 |     |           |     |     | 105 |     |           |     |     | 110 |     |           |      |
| cga       | gaa | gtc | ttc | aag | att       | gtg | cga | cga | ggc | aag       | gat | ttc | ggg | act | ttg       | 384  |
| Arg       | Glu | Val | Phe | Lys | Ile       | Val | Arg | Arg | Gly | Lys       | Asp | Phe | Gly | Thr | Leu       |      |
|           |     |     | 115 |     |           |     |     | 120 |     |           |     |     | 125 |     |           |      |
| gga       | tgg | ttc | ttc | cgt | gcg       | ttt | tgc | tac | att | gcc       | att | ttc | ttc | tac | ctg       | 432  |
| Gly       | Trp | Phe | Phe | Arg | Ala       | Phe | Cys | Tyr | Ile | Ala       | Ile | Phe | Phe | Tyr | Leu       |      |
|           | 130 |     |     |     |           |     | 135 |     |     |           |     |     | 140 |     |           |      |
| cag       | tac | cat | tgg | gtc | acc       | acg | gga | acc | tct | tgg       | ctg | ctg | gcc | gtg | gcc       | 480  |
| Gln       | Tyr | His | Trp | Val | Thr       | Thr | Gly | Thr | Ser | Trp       | Leu | Leu | Ala | Val | Ala       |      |
|           |     |     |     | 145 |           |     | 150 |     |     |           |     |     | 155 |     | 160       |      |
| tac       | gga | atc | tcc | caa | gcg       | atg | att | ggc | atg | aat       | gtc | cag | cac | gat | gcc       | 528  |
| Tyr       | Gly | Ile | Ser | Gln | Ala       | Met | Ile | Gly | Met | Asn       | Val | Gln | His | Asp | Ala       |      |
|           |     |     |     | 165 |           |     |     |     | 170 |           |     |     |     | 175 |           |      |
| aac       | cac | ggg | gcc | acc | tcc       | aag | cgt | ccc | tgg | gtc       | aac | gac | atg | cta | ggc       | 576  |
| Asn       | His | Gly | Ala | Thr | Ser       | Lys | Arg | Pro | Trp | Val       | Asn | Asp | Met | Leu | Gly       |      |
|           |     |     | 180 |     |           |     |     | 185 |     |           |     |     | 190 |     |           |      |
| ctc       | ggg | gcg | gat | ttt | att       | ggg | ggg | tcc | aag | tgg       | ctc | tgg | cag | gaa | caa       | 624  |
| Leu       | Gly | Ala | Asp | Phe | Ile       | Gly | Gly | Ser | Lys | Trp       | Leu | Trp | Gln | Glu | Gln       |      |
|           |     |     | 195 |     |           |     | 200 |     |     |           |     |     | 205 |     |           |      |
| cac       | tgg | acc | cac | cac | gct       | tac | acc | aat | cac | gcc       | gag | atg | gat | ccc | gat       | 672  |
| His       | Trp | Thr | His | His | Ala       | Tyr | Thr | Asn | His | Ala       | Glu | Met | Asp | Pro | Asp       |      |
|           |     |     | 210 |     |           |     | 215 |     |     |           |     | 220 |     |     |           |      |
| agc       | ttt | ggg | gcc | gaa | cca       | atg | ctc | cta | ttc | aac       | gac | tat | ccc | ttg | gat       | 720  |
| Ser       | Phe | Gly | Ala | Glu | Pro       | Met | Leu | Leu | Phe | Asn       | Asp | Tyr | Pro | Leu | Asp       |      |
|           |     |     |     |     | 225       |     | 230 |     |     | 235       |     |     |     | 240 |           |      |
| cat       | ccc | gct | cgt | acc | tgg       | cta | cat | cgc | ttt | caa       | gca | ttc | ttt | tac | atg       | 768  |
| His       | Pro | Ala | Arg | Thr | Trp       | Leu | His | Arg | Phe | Gln       | Ala | Phe | Phe | Tyr | Met       |      |
|           |     |     |     | 245 |           |     |     | 250 |     |           |     |     |     | 255 |           |      |
| ccc       | gtc | ttg | gct | gga | tac       | tgg | ttg | tcc | gct | gtc       | ttc | aat | cca | caa | att       | 816  |
| Pro       | Val | Leu | Ala | Gly | Tyr       | Trp | Leu | Ser | Ala | Val       | Phe | Asn | Pro | Gln | Ile       |      |
|           |     |     |     | 260 |           |     |     | 265 |     |           |     |     | 270 |     |           |      |
| ctt       | gac | ctc | cag | caa | cgc       | ggc | gca | ctt | tcc | gtc       | ggg | atc | cgt | ctc | gac       | 864  |
| Leu       | Asp | Leu | Gln | Gln | Arg       | Gly | Ala | Leu | Ser | Val       | Gly | Ile | Arg | Leu | Asp       |      |
|           |     |     |     | 275 |           |     | 280 |     |     |           |     |     | 285 |     |           |      |
| aac       | gct | ttc | att | cac | tcg       | cga | cgc | aag | tat | gcg       | gtt | ttc | tgg | cgg | gct       | 912  |
| Asn       | Ala | Phe | Ile | His | Ser       | Arg | Arg | Lys | Tyr | Ala       | Val | Phe | Trp | Arg | Ala       |      |
|           |     |     |     | 290 |           |     | 295 |     |     |           |     | 300 |     |     |           |      |
| gtg       | tac | att | gcg | gtg | aac       | gtg | att | gct | ccg | ttt       | tac | aca | aac | tcc | ggc       | 960  |
| Val       | Tyr | Ile | Ala | Val | Asn       | Val | Ile | Ala | Pro | Phe       | Tyr | Thr | Asn | Ser | Gly       |      |
|           |     |     |     | 305 |           |     | 310 |     |     | 315       |     |     |     | 320 |           |      |
| ctc       | gaa | tgg | tcc | tgg | cgt       | gtc | ttt | gga | aac | atc       | atg | ctc | atg | ggg | gtg       | 1008 |
| Leu       | Glu | Trp | Ser | Trp | Arg       | Val | Phe | Gly | Asn | Ile       | Met | Leu | Met | Gly | Val       |      |
|           |     |     |     | 325 |           |     |     | 330 |     |           |     |     |     | 335 |           |      |
| gcg       | gaa | tcg | ctc | gcg | ctg       | gcg | gtc | ctg | ttt | tcg       | ttg | tcg | cac | aat | ttc       | 1056 |
| Ala       | Glu | Ser | Leu | Ala | Leu       | Ala | Val | Leu | Phe | Ser       | Leu | Ser | His | Asn | Phe       |      |
|           |     |     |     | 340 |           |     |     | 345 |     |           |     |     | 350 |     |           |      |
| gaa       | tcc | gcg | gat | cgc | gat       | ccg | acc | gcc | cca | ctg       | aaa | aag | acg | gga | gaa       | 1104 |
| Glu       | Ser | Ala | Asp | Arg | Asp       | Pro | Thr | Ala | Pro | Leu       | Lys | Lys | Thr | Gly | Glu       |      |
|           |     |     |     | 355 |           |     | 360 |     |     |           |     |     | 365 |     |           |      |
| cca       | gtc | gac | tgg | ttc | aag       | aca | cag | gtc | gaa | act       | tcc | tgc | act | tac | ggg       | 1152 |

|     |     |     |     |     |     |     |     |     |     |      |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|
| Pro | Val | Asp | Trp | Phe | Lys | Thr | Gln | Val | Glu | Thr  | Ser | Cys | Thr | Tyr | Gly |      |
| 370 |     |     |     |     |     | 375 |     |     |     |      | 380 |     |     |     |     |      |
| gga | ttc | ctt | tcc | ggt | tgc | ttc | acg | gga | ggt | ctc  | aac | ttt | cag | ggt | gaa | 1200 |
| Gly | Phe | Leu | Ser | Gly | Cys | Phe | Thr | Gly | Gly | Leu  | Asn | Phe | Gln | Val | Glu |      |
| 385 |     |     |     |     | 390 |     |     |     |     | 395  |     |     |     |     | 400 |      |
| cac | cac | ttg | ttc | cca | cgc | atg | agc | agc | gct | tggt | tat | ccc | tac | att | gcc | 1248 |
| His | His | Leu | Phe | Pro | Arg | Met | Ser | Ser | Ala | Trp  | Tyr | Pro | Tyr | Ile | Ala |      |
|     |     |     |     | 405 |     |     |     |     | 410 |      |     |     |     | 415 |     |      |
| ccc | aag | gtc | cgc | gaa | att | tgc | gcc | aaa | cac | ggc  | gtc | cac | tac | gcc | tac | 1296 |
| Pro | Lys | Val | Arg | Glu | Ile | Cys | Ala | Lys | His | Gly  | Val | His | Tyr | Ala | Tyr |      |
|     |     |     | 420 |     |     |     |     | 425 |     |      |     |     | 430 |     |     |      |
| tac | ccg | tgg | atc | cac | caa | aac | ttt | ctc | tcc | acc  | gtc | cgc | tac | atg | cac | 1344 |
| Tyr | Pro | Trp | Ile | His | Gln | Asn | Phe | Leu | Ser | Thr  | Val | Arg | Tyr | Met | His |      |
|     |     | 435 |     |     |     |     | 440 |     |     |      |     | 445 |     |     |     |      |
| gcg | gcc | ggg | acc | ggt | gcc | aac | tgg | cgc | cag | atg  | gcc | aga | gaa | aat | ccc | 1392 |
| Ala | Ala | Gly | Thr | Gly | Ala | Asn | Trp | Arg | Gln | Met  | Ala | Arg | Glu | Asn | Pro |      |
|     | 450 |     |     |     |     | 455 |     |     |     |      | 460 |     |     |     |     |      |
| ttg | acc | gga | cgg | gcg | taa |     |     |     |     |      |     |     |     |     |     | 1410 |
| Leu | Thr | Gly | Arg | Ala |     |     |     |     |     |      |     |     |     |     |     |      |
| 465 |     |     |     |     |     |     |     |     |     |      |     |     |     |     |     |      |

&lt;210&gt; 51

&lt;211&gt; 469

&lt;212&gt; PRT

<213> *Phaeodactylum tricornutum*

&lt;400&gt; 51

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Ala | Pro | Asp | Ala | Asp | Lys | Leu | Arg | Gln | Arg | Gln | Thr | Thr | Ala | Val |  |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |  |
| Ala | Lys | His | Asn | Ala | Ala | Thr | Ile | Ser | Thr | Gln | Glu | Arg | Leu | Cys | Ser |  |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |  |
| Leu | Ser | Ser | Leu | Lys | Gly | Glu | Glu | Val | Cys | Ile | Asp | Gly | Ile | Ile | Tyr |  |
|     |     | 35  |     |     |     | 40  |     |     |     |     |     | 45  |     |     |     |  |
| Asp | Leu | Gln | Ser | Phe | Asp | His | Pro | Gly | Gly | Glu | Thr | Ile | Lys | Met | Phe |  |
|     | 50  |     |     |     | 55  |     |     |     |     |     | 60  |     |     |     |     |  |
| Gly | Gly | Asn | Asp | Val | Thr | Val | Gln | Tyr | Lys | Met | Ile | His | Pro | Tyr | His |  |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     |     | 80  |  |
| Thr | Glu | Lys | His | Leu | Glu | Lys | Met | Lys | Arg | Val | Gly | Lys | Val | Thr | Asp |  |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |  |
| Phe | Val | Cys | Glu | Tyr | Lys | Phe | Asp | Thr | Glu | Phe | Glu | Arg | Glu | Ile | Lys |  |
|     |     |     | 100 |     |     |     | 105 |     |     |     |     |     | 110 |     |     |  |
| Arg | Glu | Val | Phe | Lys | Ile | Val | Arg | Arg | Gly | Lys | Asp | Phe | Gly | Thr | Leu |  |
|     | 115 |     |     |     |     | 120 |     |     |     |     |     | 125 |     |     |     |  |
| Gly | Trp | Phe | Phe | Arg | Ala | Phe | Cys | Tyr | Ile | Ala | Ile | Phe | Phe | Tyr | Leu |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |
| Gln | Tyr | His | Trp | Val | Thr | Gly | Thr | Ser | Trp | Leu | Leu | Ala | Val | Ala |     |  |
| 145 |     |     |     | 150 |     |     |     | 155 |     |     |     |     |     | 160 |     |  |
| Tyr | Gly | Ile | Ser | Gln | Ala | Met | Ile | Gly | Met | Asn | Val | Gln | His | Asp | Ala |  |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |     |  |
| Asn | His | Gly | Ala | Thr | Ser | Lys | Arg | Pro | Trp | Val | Asn | Asp | Met | Leu | Gly |  |
|     |     | 180 |     |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |
| Leu | Gly | Ala | Asp | Phe | Ile | Gly | Gly | Ser | Lys | Trp | Leu | Trp | Gln | Glu | Gln |  |
|     |     | 195 |     |     |     | 200 |     |     |     |     |     | 205 |     |     |     |  |
| His | Trp | Thr | His | His | Ala | Tyr | Thr | Asn | His | Ala | Glu | Met | Asp | Pro | Asp |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |

Ser Phe Gly Ala Glu Pro Met Leu Leu Phe Asn Asp Tyr Pro Leu Asp  
 225 230 235 240  
 His Pro Ala Arg Thr Trp Leu His Arg Phe Gln Ala Phe Phe Tyr Met  
 245 250 255  
 Pro Val Leu Ala Gly Tyr Trp Leu Ser Ala Val Phe Asn Pro Gln Ile  
 260 265 270  
 Leu Asp Leu Gln Gln Arg Gly Ala Leu Ser Val Gly Ile Arg Leu Asp  
 275 280 285  
 Asn Ala Phe Ile His Ser Arg Arg Lys Tyr Ala Val Phe Trp Arg Ala  
 290 295 300  
 Val Tyr Ile Ala Val Asn Val Ile Ala Pro Phe Tyr Thr Asn Ser Gly  
 305 310 315 320  
 Leu Glu Trp Ser Trp Arg Val Phe Gly Asn Ile Met Leu Met Gly Val  
 325 330 335  
 Ala Glu Ser Leu Ala Leu Ala Val Leu Phe Ser Leu Ser His Asn Phe  
 340 345 350  
 Glu Ser Ala Asp Arg Asp Pro Thr Ala Pro Leu Lys Lys Thr Gly Glu  
 355 360 365  
 Pro Val Asp Trp Phe Lys Thr Gln Val Glu Thr Ser Cys Thr Tyr Gly  
 370 375 380  
 Gly Phe Leu Ser Gly Cys Phe Thr Gly Gly Leu Asn Phe Gln Val Glu  
 385 390 395 400  
 His His Leu Phe Pro Arg Met Ser Ser Ala Trp Tyr Pro Tyr Ile Ala  
 405 410 415  
 Pro Lys Val Arg Glu Ile Cys Ala Lys His Gly Val His Tyr Ala Tyr  
 420 425 430  
 Tyr Pro Trp Ile His Gln Asn Phe Leu Ser Thr Val Arg Tyr Met His  
 435 440 445  
 Ala Ala Gly Thr Gly Ala Asn Trp Arg Gln Met Ala Arg Glu Asn Pro  
 450 455 460  
 Leu Thr Gly Arg Ala  
 465

<210> 52

<211> 3598

<212> DNA

<213> artificial sequence

<220>

<221> misc\_feature

<223> Sequence represents a plant promoter-terminator expression cassette in vector pUC19

<400> 52

|             |            |             |            |            |             |     |
|-------------|------------|-------------|------------|------------|-------------|-----|
| tcgcgcggttt | cggtgatgac | ggtgaaaacc  | tctgacacat | gcagctcccg | gagacgggtca | 60  |
| cagcttggtct | gtaagcggat | gccggggagca | gacaagcccg | tcagggcgcg | tcagcgggtg  | 120 |
| ttggcggggtg | tcgggggttg | cttaactatg  | cggcatcaga | gcagattgta | ctgagagtgc  | 180 |
| accatatgcg  | gtgtgaaata | ccgcacagat  | gcgtaaggag | aaaataccgc | atcaggcgcc  | 240 |
| attcgccatt  | caggctgcgc | aactgttggg  | aagggcgatc | ggtgcgggcc | tcttcgctat  | 300 |
| tacgccagct  | ggcgaaaagg | ggatgtgctg  | caaggcgatt | aagttgggta | acgccagggt  | 360 |
| tttcccagtc  | acgacgttgt | aaaacgacgg  | ccagtgaatt | cggcgcgccg | agctcctcga  | 420 |
| gcaaattttac | acattgccac | taaacgtcta  | aacccttgta | atttgttttt | gttttactat  | 480 |
| gtgtgttatg  | tatttgattt | gcgataaatt  | tttatatttg | gtactaaatt | tataacacct  | 540 |
| tttatgctaa  | cgtttgccaa | cacttagcaa  | tttgcaagtt | gattaattga | ttctaaatta  | 600 |
| tttttgtctt  | ctaaatacat | atactaata   | actggaaatg | taaatatttg | ctaataattc  | 660 |

|             |             |             |             |             |            |      |
|-------------|-------------|-------------|-------------|-------------|------------|------|
| tactatagga  | gaattaaagt  | gagtgaatat  | ggtaccacaa  | ggtttggaga  | tttaattgtt | 720  |
| gcaatgctgc  | atggatggca  | tatacaccaa  | acattcaata  | attcttgagg  | ataataatgg | 780  |
| taccacacaa  | gatttgaggt  | gcatgaacgt  | cacgtggaca  | aaagggttag  | taatttttca | 840  |
| agacaacaat  | gttaccacac  | acaagttttg  | aggtgcatgc  | atggatgccc  | tgtggaaagt | 900  |
| ttaaaaaatat | tttggaaatg  | at ttgcatgg | aagccatgtg  | taaaaccatg  | acatccactt | 960  |
| ggaggatgca  | ataatgaaga  | aaactacaaa  | tttacetgca  | actagttatg  | catgtagtct | 1020 |
| atataatgag  | gatttttgcaa | tacttttcatt | catacacact  | cactaagttt  | tacacgatta | 1080 |
| taattttcttc | atagccagcc  | caccgcggtg  | ggcggccgcc  | tgcagtctag  | aaggcctcct | 1140 |
| gctttaatga  | gatatgcgag  | acgcctatga  | tgcgatgata  | tttgctttca  | attctgttgt | 1200 |
| gcacgttgta  | aaaaacctga  | gcatgtgtag  | ctcagatcct  | taccgccggt  | ttcggttcat | 1260 |
| tctaataaat  | atatcaccgg  | ttactatcgt  | at ttttatga | ataatattct  | ccgttcaatt | 1320 |
| tactgattgt  | ccgtcgacga  | attcgagctc  | ggcgcgccaa  | gcttggcgta  | atcatggtca | 1380 |
| tagctgtttc  | ctgtgtgaaa  | ttgttatccg  | ctcacaatat  | acacaaacat  | acgagccgga | 1440 |
| agcataaaagt | gtaaagcctg  | gggtgcctaa  | tgagtgaagt  | aactcacatt  | aattgcgttg | 1500 |
| cgctcacttc  | ccgctttcca  | gtcgggaaac  | ctgtcgtgcc  | agctgcatta  | atgaatcggc | 1560 |
| caacgcgcgc  | ggagaggcgg  | tttgcgtatt  | gggcgtcctt  | ccgcttcctc  | gctcactgac | 1620 |
| tcgctgcgct  | cggtcggttcg | gctgcggcga  | gcggtatcag  | ctcactcaaa  | ggcggtaata | 1680 |
| cggttatcca  | cagaatcagg  | ggataacgca  | ggaaagaaca  | tgtgagcaaa  | aggccagcaa | 1740 |
| aaggccagga  | accgtaaaaa  | ggccgcggtt  | ctggcggtttt | tccataggct  | ccgccccctt | 1800 |
| gacgagcatc  | acaaaaaatcg | acgctcaagt  | cagaggtggc  | gaaacccgac  | aggactataa | 1860 |
| agataccagg  | cgttttcccc  | tggaaagctcc | ctcgtgcgct  | ctcctgttcc  | gaccctgccg | 1920 |
| cttaccggat  | acctgtccgc  | ctttctccct  | tcgggaagcg  | tggcgctttc  | tcatagctca | 1980 |
| cgctgtaggt  | atctcagttc  | ggtgtaggtc  | gttcgctcca  | agctgggctg  | tgtgcacgaa | 2040 |
| ccccccggtt  | agcccagaccg | ctgcgcctta  | tccggttaact | atcgtcctga  | gtccaacccg | 2100 |
| gtaagacacg  | acttatcgcc  | actggcagca  | gccactggta  | acaggattag  | cagagcgagg | 2160 |
| tatgtaggcg  | gtgctacaga  | gttcttgaa   | tggtggccta  | actacggcta  | cactagaagg | 2220 |
| acagtatttt  | gtatctgcgc  | tctgctgaag  | ccagttacct  | tcggaaaaag  | agttggtagc | 2280 |
| tcttgatccg  | gcaaacaaac  | caccgctggt  | agcggtggtt  | tttttggttg  | caagcagcag | 2340 |
| attacgcgca  | gaaaaaaaag  | atctcaagaa  | gatcctttga  | tcttttctac  | ggggtctgac | 2400 |
| gctcagtggg  | acgaaaactc  | acgttaaggg  | at ttttggtc | tgagattatc  | aaaaaggatc | 2460 |
| ttcacctaga  | tccttttaaa  | ttaaaaatga  | agttttaaat  | caatctaaag  | tatatatgag | 2520 |
| taaaacttgg  | ctgacagtta  | ccaatgctta  | atcagtgaag  | cacctatctc  | agcgatctgt | 2580 |
| ctatttcggt  | catccatagt  | tgctgactc   | cccgtcgtgt  | agataactac  | gatacgggag | 2640 |
| ggcttaccat  | ctggccccag  | tgctgcaatg  | ataccgcgag  | acccacgctc  | accggctcca | 2700 |
| gatttatcag  | caataaacca  | gccagccgga  | agggccgagc  | gcagaagtgg  | tcctgcaact | 2760 |
| ttatccgctt  | ccatccagtc  | tattaattgt  | tgccgggaag  | ctagagtaag  | tagttcgcca | 2820 |
| gttaatagtt  | tgcgcaacgt  | tggtgccatt  | gctacaggca  | tcgtgggtgc  | acgctcgtcg | 2880 |
| tttggtatgg  | cttcattcag  | ctccggttcc  | caacgatcaa  | ggcgagttac  | atgatcccc  | 2940 |
| atgttgtgca  | aaaaagcggg  | tagctccttc  | ggtcctccga  | tcgttgctcag | aagtaagttg | 3000 |
| gccgcagtg   | tatcactcat  | ggttatggca  | gcactgcata  | attctcttac  | tgtcatgcca | 3060 |
| tccgtaagat  | gcttttctgt  | gactggtgag  | tactcaacca  | agtcattctg  | agaatagtg  | 3120 |
| atgcggcgac  | cgagttgctc  | ttgcccggcg  | tcaatacggg  | ataataccgc  | gccacatagc | 3180 |
| agaactttta  | aagtgtcat   | cattggaaaa  | cgttcttcgg  | ggcgaaaact  | ctcaaggatc | 3240 |
| ttaccgctgt  | tgagatccag  | ttcgatgtaa  | cccactcgtg  | cacccaactg  | atcttcagca | 3300 |
| tcttttactt  | tcaccagcgt  | ttctgggtga  | gcaaaaacag  | gaaggcaaaa  | tgccgcaaaa | 3360 |
| aagggaataa  | gggcgacacg  | gaaatgttga  | atactcatac  | tcttcctttt  | tcaatattat | 3420 |
| tgaagcattt  | atcagggtta  | ttgtctcatg  | agcggataca  | tatttgaatg  | tatttagaaa | 3480 |
| aataaacaaa  | taggggttcc  | gcgcacattt  | ccccgaaaag  | tgccacctga  | cgtctaagaa | 3540 |
| accattatta  | tcatgacatt  | aacctataaa  | aataggcgta  | tcacgaggcc  | ctttcgtc   | 3598 |

&lt;210&gt; 53

&lt;211&gt; 3590

&lt;212&gt; DNA

&lt;213&gt; artificial sequence

&lt;220&gt;

<221> misc\_feature  
 <223> Sequence represents a plant promoter-terminator expression cassette  
 in vector pUC19

<400> 53

|             |             |            |             |             |             |      |
|-------------|-------------|------------|-------------|-------------|-------------|------|
| tcgcgcggttt | cggatgatgac | ggtgaaaacc | tctgacacat  | gcagctccc   | gagacgggtca | 60   |
| cagcttgtct  | gtaagcggat  | gccgggagca | gacaagccc   | tcagggcgcg  | tcagcgggtg  | 120  |
| ttggcggttg  | tcggggctgg  | cttaactatg | cggcatcaga  | gcagattgta  | ctgagagtgc  | 180  |
| accatatgcg  | gtgtgaaata  | ccgcacagat | gcgtaaggag  | aaaataccgc  | atcaggcgcc  | 240  |
| attcgccatt  | caggctgcgc  | aactgttggg | aagggcgatc  | ggtgcggggc  | tcttcgctat  | 300  |
| tacgccagct  | ggcgaaaagg  | ggatgtgctg | caaggcgatt  | aagttgggta  | acgccagggt  | 360  |
| tttcccagtc  | acgacgttgt  | aaaacgacgg | ccagtgaatt  | cggcgcgccg  | agctcctcga  | 420  |
| gcaaattttac | acattgccac  | taaacgtcta | aacccttgta  | atttgttttt  | gttttactat  | 480  |
| gtgtgttatg  | tatttgattt  | gcgataaatt | tttatatttg  | gtactaaatt  | tataacacct  | 540  |
| tttatgtctaa | cgtttgccaa  | cacttagcaa | tttgcaagtt  | gattaattga  | ttctaaatta  | 600  |
| tttttgtctt  | ctaaatacat  | atactaatac | actggaaatg  | taaatatttg  | ctaataattt  | 660  |
| tactatagga  | gaattaaagt  | gagtgaatat | ggtaccacaa  | ggtttggaga  | tttaattgtt  | 720  |
| gcaatgctgc  | atggatggca  | tatacaccaa | acattcaata  | attcttgagg  | ataataatgg  | 780  |
| taccacacaa  | gatttgaggt  | gcatgaacgt | cacgtggaca  | aaaggtttag  | taatttttca  | 840  |
| agacaacaat  | gttaccacac  | acaagttttg | aggtgcatgc  | atggatgcc   | tgtggaaagt  | 900  |
| ttaaaaatat  | tttggaatg   | atttgcatgg | aagccatgtg  | taaaaccatg  | acatccactt  | 960  |
| ggaggatgca  | ataatgaaga  | aaactacaaa | tttcatgca   | actagttagt  | catgtagtct  | 1020 |
| atataatgag  | gattttgcaa  | tactttcatt | catacacact  | cactaagttt  | tacacgatta  | 1080 |
| taattttctt  | atagccaagc  | gatccgatat | cgggcccgct  | agcggttaacc | ctgctttaat  | 1140 |
| gagatatgcg  | agacgcctat  | gatcgcatga | tatttgcttt  | caattctgtt  | gtgcacgttg  | 1200 |
| taaaaaacct  | gagcatgtgt  | agctcagatc | cttaccgcgc  | gtttcggttc  | attctaataga | 1260 |
| atataatcacc | cgttactatc  | gtatttttat | gaataatatt  | ctccgttcaa  | tttactgatt  | 1320 |
| gtccgtcgac  | gaattcgagc  | tcggcgcgcc | aagcttggcg  | taatcatggt  | catagctgtt  | 1380 |
| tctgtgtga   | aattgttatc  | cgctcacaat | tccacacaac  | atacgagccg  | gaagcataaa  | 1440 |
| gtgtaaagcc  | tgggtgcct   | aatgagtga  | ctaactcaca  | ttaattgcgt  | tgcgctcact  | 1500 |
| gcccgccttc  | cagtcgggaa  | acctgtcgtg | ccagctgcatt | taatgaatcg  | gccaacgcgc  | 1560 |
| ggggagaggc  | ggtttcgcta  | ttgggcgctc | ttccgcttcc  | tcgctcactg  | actcgctgcg  | 1620 |
| ctcggtcggt  | cggtgcggc   | gagcggatc  | agctcactca  | aaggcggtta  | tacggttatc  | 1680 |
| cacagaatca  | ggggataacg  | caggaaagaa | catgtgagca  | aaaggccagc  | aaaaggccag  | 1740 |
| gaaccgtaaa  | aaggccgcgt  | tgtctggcgt | tttccatagg  | ctccgcccc   | ctgacgagca  | 1800 |
| tcacaaaaat  | cgacgctcaa  | gtcagaggtg | gcgaaacccg  | acaggactat  | aaagatacca  | 1860 |
| ggcgtttccc  | cctggaagct  | ccctcgctgc | ctctcctgtt  | ccgaccctgc  | cgcttaccgg  | 1920 |
| atacctgtcc  | gcctttctcc  | cttcgggaag | cgtggcgctt  | tctcatagct  | cacgctgtag  | 1980 |
| gtatctcagt  | tcggtgtagg  | tcgttcgctc | caagctgggc  | tgtgtgcacg  | aacccccgt   | 2040 |
| tcagcccagc  | cgctgcgcct  | tatccggtaa | ctatcgtctt  | gagtccaacc  | cggtaagaca  | 2100 |
| cgacttatcg  | ccactggcag  | cagccactgg | taacaggatt  | agcagagcga  | ggtatgtagg  | 2160 |
| cgggtgctaca | gagttcttga  | agtgggtggc | taactacggc  | tacactagaa  | ggacagtatt  | 2220 |
| tggatatctgc | gctctgctga  | agccagttac | cttcggaaaa  | agagttggta  | gctcttgatc  | 2280 |
| cggcaaaaca  | accaccgctg  | gtagcgggtg | tttttttgtt  | tgcaagcagc  | agattacgcg  | 2340 |
| cagaaaaaaa  | ggatctcaag  | aagatccttt | gatcttttct  | acggggtctg  | acgctcagtg  | 2400 |
| gaacgaaaaa  | tcacgttaag  | ggatttttgt | catgagatta  | tcaaaaagga  | tcttcaccta  | 2460 |
| gaccccttta  | aattaaaaat  | gaagttttaa | atcaatctaa  | agtatatatg  | agtaaacttg  | 2520 |
| gtctgacagt  | taccaatgct  | taatcagtag | ggcacctatc  | tcagcgatct  | gtctatttcg  | 2580 |
| ttcatccata  | gttgctcgac  | tcccgcgtg  | gtagataact  | acgatacggg  | agggcttacc  | 2640 |
| atctggcccc  | agtgcgtcaa  | tgataccgcg | agaccacgcg  | tcaccggctc  | cagattttatc | 2700 |
| agcaataaac  | cagccagccg  | gaagggccga | gcgcagaagt  | ggtcctgcaa  | ctttatccgc  | 2760 |
| ctccatccag  | tctattaatt  | gttgccggga | agctagagta  | agtagttcgc  | cagttaatag  | 2820 |
| tttgcgcaac  | gttggtgcca  | ttgctacagg | catcgtggtg  | tcacgctcgt  | cgtttggtat  | 2880 |
| ggcttcattc  | agctccggtt  | cccaacgatc | aaggcgagtt  | acatgatccc  | ccatgttgtg  | 2940 |
| caaaaaagcg  | gttagctcct  | tcggtcctcc | gatcgttgct  | agaagtaagt  | tggccgcagt  | 3000 |
| gttatcactc  | atggttatgg  | cagcactgca | taattctctt  | actgtcatgc  | catccgtaag  | 3060 |

|            |            |            |            |            |             |      |
|------------|------------|------------|------------|------------|-------------|------|
| atgcttttct | gtgactggtg | agtactcaac | caagtcattc | tgagaatagt | gtatgcgggc  | 3120 |
| accgagttgc | tcttgcccgg | cgtcaatacg | ggataatacc | gcgccacata | gcagaacttt  | 3180 |
| aaaagtgtc  | atcattggaa | aacgtttctc | ggggcgaaaa | ctctcaagga | tcttaccgct  | 3240 |
| gttgagatcc | agttcgatgt | aaccactcgc | tgcacccaac | tgatcttcag | catcttttac  | 3300 |
| tttcaccagc | gtttctgggt | gagcaaaaac | aggaaggcaa | aatgccgcaa | aaaaggggaat | 3360 |
| aagggcgaca | cggaaatgtt | gaatactcat | actcttcctt | tttcaatatt | attgaagcat  | 3420 |
| ttatcagggt | tattgtctca | tgagcggata | catatttgaa | tgtatttaga | aaaataaaca  | 3480 |
| aataggggtt | ccgcgcacat | ttccccgaaa | agtgccacct | gacgtctaag | aaaccattat  | 3540 |
| tatcatgaca | ttaacctata | aaaataggcg | tatcacgagg | ccctttcgtc |             | 3590 |

<210> 54

<211> 3584

<212> DNA

<213> artificial sequence

<220>

<221> misc\_feature

<223> Sequence represents a plant promoter-terminator expression cassette in vector pUC19

<400> 54

|             |             |            |             |             |             |      |
|-------------|-------------|------------|-------------|-------------|-------------|------|
| tcgcgcgttt  | cggatgatgac | ggtgaaaacc | tctgacacat  | gcagctccc   | gagacgggtca | 60   |
| cagcttgtct  | gtaagcggat  | gccgggagca | gacaagccc   | tcagggcgcg  | tcagcgggtg  | 120  |
| ttggcgggtg  | tcggggctgg  | cttaactatg | cggcatcaga  | gcagattgta  | ctgagagtgc  | 180  |
| accatatgcg  | gtgtgaaata  | ccgcacagat | gcgtaaggag  | aaaataccgc  | atcaggcgcc  | 240  |
| attcgccatt  | caggctgcgc  | aactgttggg | aagggcgatc  | ggtgcggggc  | tcttcgctat  | 300  |
| tacgccagct  | ggcgaaagg   | ggatgtgctg | caaggcgatt  | aagttaggta  | acgccagggt  | 360  |
| tttcccagtc  | acgacgttgt  | aaaacgacgg | ccagtgaatt  | cggcgcgccg  | agctcctcga  | 420  |
| gcaaatttac  | acattgccac  | taaacgtcta | aacccttgta  | atttgttttt  | gttttactat  | 480  |
| gtgtgttatg  | tatttgattt  | gcgataaatt | tttatatttg  | gtactaaatt  | tataaacacct | 540  |
| tttatgctaa  | cgtttgccaa  | cacttagcaa | tttgcaagtt  | gattaattga  | ttctaaatta  | 600  |
| tttttgtctt  | ctaaatacat  | atactaata  | actggaatg   | taaatatttg  | ctaataattc  | 660  |
| tactatagga  | gaattaaagt  | gagtgaatat | ggtaccacaa  | ggtttgagga  | tttaattgtt  | 720  |
| gcaatgctgc  | atggatggca  | tatacaccaa | acattcaata  | attcttgagg  | ataataatgg  | 780  |
| taccacacaa  | gatttgaggt  | gcatgaacgt | cacgtggaca  | aaaggtttag  | taatttttca  | 840  |
| agacaacaat  | gttaccacac  | acaagttttg | aggtgcatgc  | atggatgcc   | tgtggaaagt  | 900  |
| ttaaaaatat  | tttggaatg   | atttgcatgg | aagccatgtg  | taaaaccatg  | acatccactt  | 960  |
| ggaggatgca  | ataatgaaga  | aaactacaaa | tttacatgca  | actagttatg  | catgtagtct  | 1020 |
| atataatgag  | gattttgcaa  | tactttcatt | catacacact  | cactaagttt  | tacacgatta  | 1080 |
| taattttctt  | atagccagca  | gatctgccgg | catcgatccc  | gggccatggc  | ctgctttaat  | 1140 |
| gagatatgcg  | agacgcctat  | gatcgcatga | tatttgcttt  | caattctgtt  | gtgcacgttg  | 1200 |
| taaaaaacct  | gagcatgtgt  | agctcagatc | cttaccgccc  | gtttcggttc  | attctaattga | 1260 |
| atatatcacc  | cgttactatc  | gtatttttat | gaataatatt  | ctccgttcaa  | tttactgatt  | 1320 |
| gtccgctgac  | gagctcggcg  | cgccaagctt | ggcgtaatca  | tggtcatagc  | tgtttcctgt  | 1380 |
| gtgaaattgt  | tatccgctca  | caattccaca | caacatacga  | gccggaagca  | taaagtgtaa  | 1440 |
| agcctggggg  | gcctaattgag | tgagctaact | cacattaatt  | gcgttgcgct  | cactgcccgc  | 1500 |
| tttccagtcg  | ggaaacctgt  | cgtgccagct | gcattaatga  | atcggccaac  | gcgcggggag  | 1560 |
| aggcgggttg  | cgtatttgcc  | gctcttcgcg | ttcctcgctc  | actgactcgc  | tgcgctcggt  | 1620 |
| cgttcggctg  | cggcgagcgg  | tatcagctca | ctcaaaggcg  | gtaatacggg  | tatccacaga  | 1680 |
| atcaggggat  | aacgcaggaa  | agaacatgtg | agcaaaaagg  | cagcaaaaagg | ccaggaaccg  | 1740 |
| taaaaaggcc  | gcgttgctgg  | cgtttttcca | taggctccgc  | ccccctgacg  | agcatcacia  | 1800 |
| aaatcgacgc  | tcaagtcaga  | ggtggcgaaa | cccgcacagga | ctataaagat  | accaggcggt  | 1860 |
| tccccctgga  | agctccctcg  | tgcgctctcc | tgttccgacc  | ctgccgctta  | ccggatacct  | 1920 |
| gtccgccttt  | ctcccttcgg  | gaagcgtggc | gctttctcat  | agctcacgct  | gtaggtatct  | 1980 |
| cagttcgggtg | taggtcgttc  | gctccaagct | gggctgtgtg  | cacgaacccc  | ccgttcagcc  | 2040 |

|            |             |             |            |             |             |      |
|------------|-------------|-------------|------------|-------------|-------------|------|
| cgaccgctgc | gccttatccg  | gtaactatcg  | tcttgagtc  | aaccggttaa  | gacacgactt  | 2100 |
| atcgccactg | gcagcagcca  | ctggtaacag  | gattagcaga | gcgagggtatg | taggcggtgc  | 2160 |
| tacagagttc | ttgaagtgg   | ggcctaacta  | cggctacact | agaaggacag  | tatttggtat  | 2220 |
| ctgcgctctg | ctgaagccag  | ttaccttcgg  | aaaaagagtt | ggtagctctt  | gatccggcaa  | 2280 |
| acaaaccacc | gctggtagcg  | gtgggttttt  | tgtttgcaag | cagcagatta  | cgcgcagaaa  | 2340 |
| aaaaggatct | caagaagatc  | ctttgatctt  | ttctacggg  | tctgacgctc  | agtggaacga  | 2400 |
| aaactcacgt | taagggattt  | tggatcatgag | attatcaaaa | aggatcttca  | cctagatcct  | 2460 |
| tttaaattaa | aatgaagtt   | ttaaatcaat  | ctaaagtata | tatgagtaaa  | cttgggtctga | 2520 |
| cagttaccaa | tgcttaatca  | gtgaggcacc  | tatctcagcg | atctgtctat  | ttcgttcatc  | 2580 |
| catagttgcc | tgactccccg  | tcgtgtagat  | aactacgata | cgggagggct  | taccatctgg  | 2640 |
| ccccagtgtc | gcaatgatac  | cgcgagaccc  | acgtcaccg  | gctccagatt  | tatcagcaat  | 2700 |
| aaaccagcca | gccggaagg   | ccgagcgag   | aagtgtcct  | gcaactttat  | ccgcctccat  | 2760 |
| ccagtctatt | aattgttgcc  | gggaagctag  | agtaagtagt | tcgccagtta  | atagtttgcg  | 2820 |
| caacgttgtt | gccattgcta  | caggcatcgt  | ggtgtcacgc | tcgtcgtttg  | gtatggcttc  | 2880 |
| attcagctcc | ggttcccaac  | gatcaaggcg  | agttacatga | tccccatgt   | tgtgcaaaaa  | 2940 |
| agcggttagc | tccttcggtc  | ctccgatcgt  | tgtcagaagt | aagttggccg  | cagtgttatc  | 3000 |
| actcatggtt | atggcagcac  | tgcataattc  | tcttactgtc | atgccatccg  | taagatgctt  | 3060 |
| ttctgtgact | ggtgagtact  | caaccaagtc  | attctgagaa | tagtgtatgc  | ggcgaccgag  | 3120 |
| ttgctcttgc | ccggcgctca  | tacgggataa  | taccgcgcca | catagcagaa  | ctttaaaagt  | 3180 |
| gctcatcatt | ggaaaacgtt  | cttcggggcg  | aaaactctca | aggatcttac  | cgctgttgag  | 3240 |
| atccagttcg | atgtaacca   | ctcgtgcacc  | caactgatct | tcagcatctt  | ttactttcac  | 3300 |
| cagcgtttct | gggtgagcaa  | aaacaggaag  | gcaaaatgcc | gcaaaaaagg  | gaataagggc  | 3360 |
| gacacggaaa | tggtgaatac  | tcatactctt  | cctttttcaa | tattattgaa  | gcatttatca  | 3420 |
| gggttattgt | ctcatgagcg  | gatacatatt  | tgaatgtatt | tagaaaaata  | aacaaatagg  | 3480 |
| ggttccgcgc | acatttcccc  | gaaaagtgcc  | acctgacgtc | taagaaacca  | ttattatcat  | 3540 |
| gacattaacc | tataaaaaata | ggcgtatcac  | gaggcccttt | cgtc        |             | 3584 |

<210> 55

<211> 4507

<212> DNA

<213> artificial sequence

<220>

<221> misc\_feature

<223> Sequence represents a plant promoter-terminator expression cassette in vector pUC19

<400> 55

|            |            |            |            |            |             |      |
|------------|------------|------------|------------|------------|-------------|------|
| tcgcgcgttt | cggtgatgac | ggtgaaaacc | tctgacacat | gcagctccc  | gagacgggtca | 60   |
| cagcttgtct | gtaagcggat | gccgggagca | gacaagccc  | tcagggcgcg | tcagcgggtg  | 120  |
| ttggcgggtg | tcggggctgg | cttaactatg | cggcatcaga | gcagattgta | ctgagagtgc  | 180  |
| accatatgcg | gtgtgaaata | ccgcacagat | gcgtaaggag | aaaataccgc | atcaggcgcc  | 240  |
| attcgccatt | caggctgcgc | aactgttggg | aagggcgatc | ggtgcggggc | tcttcgctat  | 300  |
| tacgccagct | ggcgaaagg  | ggatgtgctg | caaggcgatt | aagttgggta | acgccaggg   | 360  |
| tttcccagtc | acgacgttgt | aaaacgacgg | ccagtgaatt | cggcgcgccg | agctcctcga  | 420  |
| gcaaatttac | acattgccac | taaacgtcta | aaccttgta  | atttggtttt | gttttactat  | 480  |
| gtgtgttatg | tatttgattt | gcgataaatt | tttatatttg | gtactaaatt | tataaacctt  | 540  |
| tttatgctaa | cgtttgccaa | cacttagcaa | tttgcaagtt | gattaattga | ttctaaatta  | 600  |
| tttttgtctt | ctaaatacat | atactaatac | actggaaatg | taaatatttg | ctaataattc  | 660  |
| tactatagga | gaattaaagt | gagtgaatat | ggtaaccaca | ggtttgagga | tttaattggt  | 720  |
| gcaatgctgc | atggatggca | tatacaccaa | acattcaata | attcttgagg | ataataatgg  | 780  |
| taccacacaa | gatttgaggt | gcatgaacgt | cacgtggaca | aaaggtttag | taatttttca  | 840  |
| agacaacaat | gttaccacac | acaagttttg | aggtgcatgc | atggatgcc  | tgtggaaagt  | 900  |
| ttaaaaatat | tttggaaatg | atttgcatgg | aagccatgtg | taaaaccatg | acatccactt  | 960  |
| ggaggatgca | ataatgaaga | aaactacaaa | tttacatgca | actagttatg | catgtagtct  | 1020 |



|             |             |             |             |             |             |      |
|-------------|-------------|-------------|-------------|-------------|-------------|------|
| atataatgag  | gatttttgc   | tacttttcatt | catacacact  | cactaagttt  | tacacgatta  | 1080 |
| taattttcttc | atagccagcc  | caccgcggtg  | ggcggccgcc  | tgcagtctag  | aaggcctcct  | 1140 |
| gctttaatga  | gatatgag    | acgcctatga  | tcgcatgata  | tttgctttca  | attctgttgt  | 1200 |
| gcacgttgta  | aaaaacctga  | gcatgtgtag  | ctcagatcct  | taccgccggt  | ttcggttcat  | 1260 |
| tctaatagaat | atatcacccg  | ttactatcgt  | atTTTTatga  | ataatattct  | ccgttcaatt  | 1320 |
| tactgattgt  | ccgtcgagca  | aattttacaca | ttgccactaa  | acgtctaaac  | ccttgttaatt | 1380 |
| tgTTTTtTgt  | ttactatgtg  | tgttatgtat  | ttgatttgcg  | ataaattttt  | atatttggta  | 1440 |
| ctaaattttat | aacacctttt  | atgctaacgt  | ttgccaaacac | ttagcaattt  | gcaagttgat  | 1500 |
| taattgattc  | taaattattt  | ttgtcttcta  | aatacatata  | ctaatacaact | ggaaatgtaa  | 1560 |
| atatttTgcta | atatttctac  | tataggagaa  | ttaaagtTgag | tgaatatggt  | accacaaggt  | 1620 |
| ttggagattt  | aattgttgca  | atgctgcatg  | gatggcatat  | acaccaaaca  | ttcaataatt  | 1680 |
| cttgaggata  | ataatggtac  | cacacaagat  | ttgaggtgca  | tgaacgtcac  | gtggacaaaa  | 1740 |
| ggtttagtaa  | tttttcaaga  | caacaatggt  | accacacaca  | agttttgagg  | tgcatgcatg  | 1800 |
| gatgccctgt  | ggaaagtTta  | aaaatatttt  | ggaaatgatt  | tgcatggaag  | ccatgtgtaa  | 1860 |
| aaccatgaca  | tccacttTga  | ggatgcaata  | atgaagaaaa  | ctacaaattt  | acatgcaact  | 1920 |
| agttatgcat  | gtagtctata  | taatgaggat  | tttgcaatac  | tttcattcat  | acacactcac  | 1980 |
| taagttttac  | acgattataa  | tttcttcata  | gccagcggt   | ccgatatcgg  | gcccgttagc  | 2040 |
| gttaaccctg  | ctttaatgag  | atatgcgaga  | cgcctatgat  | cgcatgatat  | ttgctttcaa  | 2100 |
| ttctgttgtg  | cacgttgtaa  | aaaacctgag  | catgtgtagc  | tcagatcctt  | accgccggtt  | 2160 |
| tcggttcatt  | ctaatagaata | tatcacccgt  | tactatcgta  | tttttatgaa  | taataattctc | 2220 |
| cgttcaattt  | actgattgtc  | cgtcgacgaa  | ttcgagctcg  | gcgcgccaag  | cttggcgtaa  | 2280 |
| tcattggtcat | agctgtttcc  | tgtgtgaaat  | tgttatccgc  | tcacaattcc  | acacaacata  | 2340 |
| cgagccggaa  | gcataaagtg  | taaagcctgg  | ggTgccta    | gagtTgagcta | actcacatta  | 2400 |
| attgctgtTgc | gctcactgcc  | cgctttccag  | tcgggaaacc  | tgctcgTgcca | gctgcattaa  | 2460 |
| tgaatcgTcc  | aacgcgcggg  | gagaggcggt  | ttgcgtattg  | ggcgctcttc  | cgcttcctcg  | 2520 |
| ctcactgact  | cgctgcgctc  | ggTcgTtcgg  | ctgcggcgag  | cggtatcagc  | tcactcaaag  | 2580 |
| gcggtataac  | ggTtatccac  | agaatcaggg  | gataacgcag  | gaaagaacat  | gtgagcaaaa  | 2640 |
| ggccagcaaa  | aggccaggaa  | ccgtaaaaag  | gccgcgtTgc  | tggcgttttt  | ccataggctc  | 2700 |
| cgccccctg   | acgagcatca  | caaaaaatcga | cgctcaagtc  | agaggtggcg  | aaaccgcaga  | 2760 |
| ggactataaaa | gataccaggc  | gtttccccct  | ggaagctccc  | tcgtgcgctc  | tcctgttccg  | 2820 |
| accctgcgcg  | ttaccggata  | cctgtccgcc  | tttctccctt  | cgTgaagcgt  | ggcgctttct  | 2880 |
| catagctcac  | gctgtaggta  | tctcagttcg  | gtgtaggtcg  | ttcgctccaa  | gctgggctgt  | 2940 |
| gtgcacgaac  | ccccgTtTca  | gcccagccgc  | tgcgcttat   | ccggtaaacta | tcgtcttgag  | 3000 |
| tccaaccctg  | taagacacga  | cttatcgcca  | ctggcagcag  | ccactggtaa  | caggattagc  | 3060 |
| agagcgaggT  | atgtaggcg   | tgctacagag  | ttcttgaagt  | ggTggccta   | ctacggctac  | 3120 |
| actagaagga  | cagtatttgg  | tatctgcgct  | ctgctgaagc  | cagttacctt  | cggaaaaaga  | 3180 |
| gttggttagct | cttgatccgg  | caaacaaacc  | accgctggta  | gcggtggTtt  | ttttgtttgc  | 3240 |
| aagcagcaga  | ttacgcgcag  | aaaaaaaggga | tctcaagaag  | atcctttgat  | cttttctacg  | 3300 |
| gggtctgacg  | ctcagtgga   | cgaaaactca  | cgTtaaggga  | ttttggTcat  | gagattatca  | 3360 |
| aaaaggatct  | tcacctagat  | ccttttTaaat | taaaaaatgaa | gttttTaaatc | aatctaaagt  | 3420 |
| atatatgagT  | aaactTggtc  | tgacagTtac  | caatgctTaa  | tcagTgaggc  | acctatctca  | 3480 |
| gcgatctgtc  | tatttctgtt  | atccatagtt  | gcctgactcc  | ccgtcgTgta  | gataactacg  | 3540 |
| atacgTgag   | gcttaccatc  | tgTccccagT  | gctgcaatga  | taccgcgaga  | cccacgctca  | 3600 |
| ccggtctcag  | atttatcagc  | aataaaaccag | ccagccggaa  | gggccgagcg  | cagaagtggT  | 3660 |
| cctgcaactt  | tatccgcctc  | catccagTct  | attaattgtt  | gccgggaagc  | tagagTaa    | 3720 |
| agttcgccag  | ttaatagTtt  | gcgcaacgTt  | gttgccattg  | ctacaggcat  | cgtggTgtca  | 3780 |
| cgctcgTcgt  | ttggTatggc  | ttcattcagc  | tcggTtccc   | aacgatcaag  | gcgagTtaca  | 3840 |
| Tgatccccca  | TgtTgtgcaa  | aaaagcgTt   | agctccttcg  | gtcctccgat  | cgtTgtcaga  | 3900 |
| agTaaTgtTg  | ccgagTgtt   | atcactcatg  | gttatggcag  | cactgcataa  | ttctcttact  | 3960 |
| gtcatgccat  | ccgTaaagatg | cttttctgtg  | actggTgagT  | actcaaccaa  | gtcattctga  | 4020 |
| gaatagTgta  | TgcgTcgacc  | gagTtgcTct  | Tgccccggcgt | caatacggga  | taataccgcg  | 4080 |
| ccacatagca  | gaactTtTaaa | agTgctcatc  | attggaaaac  | gttcttcggg  | gcgaaaactc  | 4140 |
| Tcaaggatct  | taccgctgtt  | gagatccagT  | tcgatgTaa   | ccactcgTgc  | acccaactga  | 4200 |
| Tcttcagcat  | cttttacttt  | caccagcgTt  | Tctgggtgag  | caaaaacagg  | aaggcaaaat  | 4260 |
| gccgcaaaaa  | agggaataag  | ggcgacacgg  | aaatgtTgaa  | Tactcatact  | cttctttttt  | 4320 |
| caatattatt  | gaagcattTta | Tcagggttat  | Tgtctcatga  | gcggatacat  | atttgaatgt  | 4380 |
| atttagaaaa  | ataaacaat   | agggtTtccg  | cgcacatttc  | cccgaagT    | gccacctgac  | 4440 |

gtctaagaaa ccattattat catgacatta acctataaaa ataggcgtat cacgaggccc 4500  
 tttcgtc 4507

<210> 56

<211> 17752

<212> DNA

<213> *Phaeodactylum tricornutum*, *Physcomitrella patens*

<220>

<221> CDS

<222> (11543)..(12415)

<223> Delta-6-elongase

<220>

<221> CDS

<222> (13313)..(14890)

<223> Delta-6-desaturase

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| gtagccggat  | caagcgtatg | cagccgcgcg | attgcatcag  | ccatgatgga  | tactttctcg  | 9840  |
| gcaggagcaa  | ggtgagatga | caggagatcc | tgccccggca  | cttcgcccga  | tagcagccag  | 9900  |
| tcccttcccg  | cttcagtgac | aacgtcgagc | acagctgcgc  | aaggaacgcc  | cgctcgtggc  | 9960  |
| agccacgata  | gccgcgctgc | ctcgtcctgc | agttcattca  | gggcaccgga  | caggtcggtc  | 10020 |
| ttgacaaaaa  | gaaccgggag | cccctgcgct | gacagccgga  | acacggcggc  | atcagagcag  | 10080 |
| ccgattgtct  | gttggtgcca | gtcatagccg | aatagcctct  | ccacccaagc  | ggccggagaa  | 10140 |
| cctgcgtgca  | atccatcttg | ttcaatccaa | gctcccattg  | gccctcgact  | agagtcgaga  | 10200 |
| tctggattga  | gagtgaatat | gagactctaa | ttggataccg  | aggggaattt  | atggaacgtc  | 10260 |
| agtggagcat  | ttttgacaag | aaatatattg | tagctgatag  | tgaccttagg  | cgacttttga  | 10320 |
| acgcgcaata  | atggtttctg | acgtatgtgc | ttagctcatt  | aaactccaga  | aaccgcggc   | 10380 |
| tgagtggctc  | cttcaacggt | gcggttctgt | cagttccaaa  | cgtaaaacgg  | cttgtcccgc  | 10440 |
| gtcatcggcg  | ggggtcataa | cgtgactccc | ttaattctcc  | gctcatgatc  | ttgatccctt  | 10500 |
| gcgccatcag  | atccttggcg | gcaagaaagc | catccagttt  | actttgcagg  | gcttcccaac  | 10560 |
| cttaccagag  | ggcgccccag | ctggcaattc | cggttcgctt  | gctgtccata  | aaaccgcccc  | 10620 |
| gtctagctat  | cgccatgtaa | gcccactgca | agctacctgc  | tttctctttg  | cgcttgcggt  | 10680 |
| ttcccttgtc  | cagatagccc | agtagctgac | attcatccgg  | ggtcagcacc  | gtttctgcgg  | 10740 |
| actggctttc  | tacgtgttcc | gcttccttta | gcagcccttg  | cgccctgagt  | gcttgccgga  | 10800 |
| gcgtgaagct  | tgcatgcctg | caggtcgacg | gcgcgcccag  | ctcctcgagc  | aaatttacac  | 10860 |
| attgccacta  | aacgtctaaa | cccttgtaat | ttgtttttgt  | tttactatgt  | gtgttatgta  | 10920 |
| tttgatttgc  | gataaatttt | tatatattgt | actaaattta  | taacaccttt  | tatgctaacg  | 10980 |
| tttgccaaca  | cttagcaatt | tgcaagttga | ttaattgatt  | ctaaattatt  | tttgtcttct  | 11040 |
| aaatacatat  | actaatcaac | tggaaatgta | aatatttgct  | aatatttcta  | ctataggaga  | 11100 |
| attaaagtga  | gtgaatatgg | taccacaagg | tttgagagatt | taattgttgc  | aatgtgcat   | 11160 |
| ggatggcata  | tacaccaaac | attcaataat | tcttgaggat  | aataatggta  | ccacacaaga  | 11220 |
| tttgaggtgc  | atgaacgtca | cgtggacaaa | aggttttagta | atttttcaag  | acaacaatgt  | 11280 |
| taccacacac  | aagttttgag | gtgcatgcat | ggatgccctg  | tggaaagttt  | aaaaatattt  | 11340 |
| tggaaatgat  | ttgcatggaa | gccatgtgta | aaaccatgac  | atccacttgg  | aggatgcaat  | 11400 |
| aatgaagaaa  | actacaaatt | tacatgcaac | tagttatgca  | tgtagtctat  | ataatgagga  | 11460 |
| ttttgcaata  | ctttcattca | tacacactca | ctaagtttta  | cacgattata  | atttcttcat  | 11520 |
| agccagccca  | ccgcggtgga | aa atg gag | gtc gtg gag | aga ttc tac | ggt gag     | 11572 |
| Met Glu Val Val Glu Arg Phe Tyr Gly Glu                         |            |            |             |             |             |       |
| 1 5 10  |            |            |             |             |             |       |
| ttg gat ggg aag gtc tcg cag ggc gtg aat gca ttg ctg ggt agt ttt |            |            |             |             |             | 11620 |
| Leu Asp Gly Lys Val Ser Gln Gly Val Asn Ala Leu Leu Gly Ser Phe |            |            |             |             |             |       |
| 15 20 25  |            |            |             |             |             |       |
| ggg gtg gag ttg acg gat acg ccc act acc aaa ggc ttg ccc ctc gtt |            |            |             |             |             | 11668 |
| Gly Val Glu Leu Thr Asp Thr Pro Thr Thr Lys Gly Leu Pro Leu Val |            |            |             |             |             |       |
| 30 35 40  |            |            |             |             |             |       |
| gac agt ccc aca ccc atc gtc ctc ggt gtt tct gta tac ttg act att |            |            |             |             |             | 11716 |

| Asp | Ser | Pro<br>45 | Thr | Pro | Ile | Val | Leu<br>50 | Gly | Val | Ser | Val | Tyr<br>55 | Leu | Thr | Ile |       |
|-----|-----|-----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|-----------|-----|-----|-----|-------|
| gtc | att | gga       | ggg | ctt | ttg | tgg | ata       | aag | gcc | agg | gat | ctg       | aaa | ccg | cgc | 11764 |
| Val | Ile | Gly       | Gly | Leu | Leu | Trp | Ile       | Lys | Ala | Arg | Asp | Leu       | Lys | Pro | Arg |       |
|     | 60  |           |     |     |     | 65  |           |     |     |     | 70  |           |     |     |     |       |
| gcc | tcg | gag       | cca | ttt | ttg | ctc | caa       | gct | ttg | gtg | ctt | gtg       | cac | aac | ctg | 11812 |
| Ala | Ser | Glu       | Pro | Phe | Leu | Leu | Gln       | Ala | Leu | Val | Leu | Val       | His | Asn | Leu |       |
| 75  |     |           |     |     | 80  |     |           |     |     | 85  |     |           |     |     | 90  |       |
| ttc | tgt | ttt       | gcg | ctc | agt | ctg | tat       | atg | tgc | gtg | ggc | atc       | gct | tat | cag | 11860 |
| Phe | Cys | Phe       | Ala | Leu | Ser | Leu | Tyr       | Met | Cys | Val | Gly | Ile       | Ala | Tyr | Gln |       |
|     |     |           |     | 95  |     |     |           |     | 100 |     |     |           |     | 105 |     |       |
| gct | att | acc       | tgg | cgg | tac | tct | ctc       | tgg | ggc | aat | gca | tac       | aat | cct | aaa | 11908 |
| Ala | Ile | Thr       | Trp | Arg | Tyr | Ser | Leu       | Trp | Gly | Asn | Ala | Tyr       | Asn | Pro | Lys |       |
|     |     |           | 110 |     |     |     |           | 115 |     |     |     |           | 120 |     |     |       |
| cat | aaa | gag       | atg | gcg | att | ctg | gta       | tac | ttg | ttc | tac | atg       | tct | aag | tac | 11956 |
| His | Lys | Glu       | Met | Ala | Ile | Leu | Val       | Tyr | Leu | Phe | Tyr | Met       | Ser | Lys | Tyr |       |
|     |     | 125       |     |     |     | 130 |           |     |     |     |     | 135       |     |     |     |       |
| gtg | gaa | ttc       | atg | gat | acc | gtt | atc       | atg | ata | ctg | aag | cgc       | agc | acc | agg | 12004 |
| Val | Glu | Phe       | Met | Asp | Thr | Val | Ile       | Met | Ile | Leu | Lys | Arg       | Ser | Thr | Arg |       |
|     | 140 |           |     |     |     | 145 |           |     |     |     | 150 |           |     |     |     |       |
| caa | ata | agc       | ttc | ctc | cac | gtt | tat       | cat | cat | tct | tca | att       | tcc | ctc | att | 12052 |
| Gln | Ile | Ser       | Phe | Leu | His | Val | Tyr       | His | His | Ser | Ser | Ile       | Ser | Leu | Ile |       |
| 155 |     |           |     | 160 |     |     |           |     |     | 165 |     |           |     |     | 170 |       |
| tgg | tgg | gct       | att | gct | cat | cac | gct       | cct | ggc | ggg | gaa | gca       | tat | tgg | tct | 12100 |
| Trp | Trp | Ala       | Ile | Ala | His | His | Ala       | Pro | Gly | Gly | Glu | Ala       | Tyr | Trp | Ser |       |
|     |     |           |     | 175 |     |     |           |     | 180 |     |     |           |     | 185 |     |       |
| gcg | gct | ctg       | aac | tca | gga | gtg | cat       | gtt | ctc | atg | tat | gcg       | tat | tac | ttc | 12148 |
| Ala | Ala | Leu       | Asn | Ser | Gly | Val | His       | Val | Leu | Met | Tyr | Ala       | Tyr | Tyr | Phe |       |
|     |     |           | 190 |     |     | 195 |           |     |     |     |     |           | 200 |     |     |       |
| ttg | gct | gcc       | tgc | ctt | cga | agt | agc       | cca | aag | tta | aaa | aat       | aag | tac | ctt | 12196 |
| Leu | Ala | Ala       | Cys | Leu | Arg | Ser | Ser       | Pro | Lys | Leu | Lys | Asn       | Lys | Tyr | Leu |       |
|     |     | 205       |     |     |     | 210 |           |     |     |     |     | 215       |     |     |     |       |
| ttt | tgg | ggc       | agg | tac | ttg | aca | caa       | ttc | caa | atg | ttc | cag       | ttt | atg | ctg | 12244 |
| Phe | Trp | Gly       | Arg | Tyr | Leu | Thr | Gln       | Phe | Gln | Met | Phe | Gln       | Phe | Met | Leu |       |
|     | 220 |           |     |     |     | 225 |           |     |     |     | 230 |           |     |     |     |       |
| aac | tta | gtg       | cag | gct | tac | tac | gac       | atg | aaa | acg | aat | gcg       | cca | tat | cca | 12292 |
| Asn | Leu | Val       | Gln | Ala | Tyr | Tyr | Asp       | Met | Lys | Thr | Asn | Ala       | Pro | Tyr | Pro |       |
| 235 |     |           |     | 240 |     |     |           |     |     | 245 |     |           |     |     | 250 |       |
| caa | tgg | ctg       | atc | aag | att | ttg | ttc       | tac | tac | atg | atc | tcg       | ttg | ctg | ttt | 12340 |
| Gln | Trp | Leu       | Ile | Lys | Ile | Leu | Phe       | Tyr | Tyr | Met | Ile | Ser       | Leu | Leu | Phe |       |
|     |     | </        |     |     |     |     |           |     |     |     |     |           |     |     |     |       |

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agtaattttt caagacaaca atgttaccac acacaagttt tgaggtgcat gcatggatgc 13095
cctgtggaaa gtttaaaaat attttggaaa tgatttgcac ggaagccatg tgtaaaacca 13155
tgacatccac ttggaggatg caataatgaa gaaaactaca aattttacatg caactagtta 13215
tgcatgtagt ctatataatg aggattttgc aatactttca ttcatacaca ctcactaagt 13275
tttacacgat tataattttct tcatagccag cggatcc atg gta ttc gcg ggc ggt 13330
                                Met Val Phe Ala Gly Gly
                                295
gga ctt cag cag ggc tct ctc gaa gaa aac atc gac gtc gag cac att 13378
Gly Leu Gln Gln Gly Ser Leu Glu Glu Asn Ile Asp Val Glu His Ile
                                300                                305                                310
gcc agt atg tct ctc ttc agc gac ttc ttc agt tat gtg tct tca act 13426
Ala Ser Met Ser Leu Phe Ser Asp Phe Phe Ser Tyr Val Ser Ser Thr
                                315                                320                                325
gtt ggt tcg tgg agc gta cac agt ata caa cct ttg aag cgc ctg acg 13474
Val Gly Ser Trp Ser Val His Ser Ile Gln Pro Leu Lys Arg Leu Thr
                                330                                335                                340
agt aag aag cgt gtt tcg gaa agc gct gcc gtg caa tgt ata tca gct 13522
Ser Lys Lys Arg Val Ser Glu Ser Ala Ala Val Gln Cys Ile Ser Ala
                                345                                350                                355                                360
gaa gtt cag aga aat tcg agt acc cag gga act gcg gag gca ctc gca 13570
Glu Val Gln Arg Asn Ser Ser Thr Gln Gly Thr Ala Glu Ala Leu Ala
                                365                                370                                375
gaa tca gtc gtg aag ccc acg aga cga agg tca tct cag tgg aag aag 13618
Glu Ser Val Val Lys Pro Thr Arg Arg Arg Ser Ser Gln Trp Lys Lys
                                380                                385                                390
tcg aca cac ccc cta tca gaa gta gca gta cac aac aag cca agc gat 13666
Ser Thr His Pro Leu Ser Glu Val Ala Val His Asn Lys Pro Ser Asp
                                395                                400                                405
tgc tgg att gtt gta aaa aac aag gtg tat gat gtt tcc aat ttt gcg 13714
Cys Trp Ile Val Val Lys Asn Lys Val Tyr Asp Val Ser Asn Phe Ala
                                410                                415                                420
gac gag cat ccc gga gga tca gtt att agt act tat ttt gga cga gac 13762
Asp Glu His Pro Gly Gly Ser Val Ile Ser Thr Tyr Phe Gly Arg Asp
                                425                                430                                435                                440
ggc aca gat gtt ttc tct agt ttt cat gca gct tct aca tgg aaa att 13810
Gly Thr Asp Val Phe Ser Ser Phe His Ala Ala Ser Thr Trp Lys Ile
                                445                                450                                455
ctt caa gac ttt tac att ggt gac gtg gag agg gtg gag ccg act cca 13858
Leu Gln Asp Phe Tyr Ile Gly Asp Val Glu Arg Val Glu Pro Thr Pro
                                460                                465                                470
gag ctg ctg aaa gat ttc cga gaa atg aga gct ctt ttc ctg agg gag 13906
Glu Leu Leu Lys Asp Phe Arg Glu Met Arg Ala Leu Phe Leu Arg Glu
                                475                                480                                485
caa ctt ttc aaa agt tcg aaa ttg tac tat gtt atg aag ctg ctc acg 13954
Gln Leu Phe Lys Ser Ser Lys Leu Tyr Tyr Val Met Lys Leu Leu Thr
                                490                                495                                500
aat gtt gct att ttt gct gcg agc att gca ata ata tgt tgg agc aag 14002
Asn Val Ala Ile Phe Ala Ala Ser Ile Ala Ile Cys Trp Ser Lys
                                505                                510                                515                                520
act att tca gcg gtt ttg gct tca gct tgt atg atg gct ctg tgt ttc 14050
Thr Ile Ser Ala Val Leu Ala Ser Ala Cys Met Met Ala Leu Cys Phe
                                525                                530                                535
caa cag tgc gga tgg cta tcc cat gat ttt ctc cac aat cag gtg ttt 14098
Gln Gln Cys Gly Trp Leu Ser His Asp Phe Leu His Asn Gln Val Phe
                                540                                545                                550
gag aca cgc tgg ctt aat gaa gtt gtc ggg tat gtg atc ggc aac gcc 14146
Glu Thr Arg Trp Leu Asn Glu Val Val Gly Tyr Val Ile Gly Asn Ala

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|   |     |     |       |
|---|-----|-----|-------|
| 555   | 560 | 565 |       |
| gtt ctg ggg ttt agt aca ggg tgg tgg aag gag aag cat aac ctt cat     |     |     | 14194 |
| Val Leu Gly Phe Ser Thr Gly Trp Trp Lys Glu Lys His Asn Leu His     |     |     |       |
| 570   | 575 | 580 |       |
| cat gct gct cca aat gaa tgc gat cag act tac caa cca att gat gaa     |     |     | 14242 |
| His Ala Ala Pro Asn Glu Cys Asp Gln Thr Tyr Gln Pro Ile Asp Glu     |     |     |       |
| 585   | 590 | 595 | 600   |
| gat att gat act ctc ccc ctc att gcc tgg agc aag gac ata ctg gcc     |     |     | 14290 |
| Asp Ile Asp Thr Leu Pro Leu Ile Ala Trp Ser Lys Asp Ile Leu Ala     |     |     |       |
| 605   | 610 | 615 |       |
| aca gtt gag aat aag aca ttc ttg cga atc ctc caa tac cag cat ctg     |     |     | 14338 |
| Thr Val Glu Asn Lys Thr Phe Leu Arg Ile Leu Gln Tyr Gln His Leu     |     |     |       |
| 620   | 625 | 630 |       |
| ttc ttc atg ggt ctg tta ttt ttc gcc cgt ggt agt tgg ctc ttt tgg     |     |     | 14386 |
| Phe Phe Met Gly Leu Leu Phe Phe Ala Arg Gly Ser Trp Leu Phe Trp     |     |     |       |
| 635   | 640 | 645 |       |
| agc tgg aga tat acc tct aca gca gtg ctc tca cct gtc gac agg ttg     |     |     | 14434 |
| Ser Trp Arg Tyr Thr Ser Thr Ala Val Leu Ser Pro Val Asp Arg Leu     |     |     |       |
| 650   | 655 | 660 |       |
| ttg gag aag gga act gtt ctg ttt cac tac ttt tgg ttc gtc ggg aca     |     |     | 14482 |
| Leu Glu Lys Gly Thr Val Leu Phe His Tyr Phe Trp Phe Val Gly Thr     |     |     |       |
| 665   | 670 | 675 | 680   |
| gcg tgc tat ctt ctc cct ggt tgg aag cca tta gta tgg atg gcg gtg     |     |     | 14530 |
| Ala Cys Tyr Leu Leu Pro Gly Trp Lys Pro Leu Val Trp Met Ala Val     |     |     |       |
| 685   | 690 | 695 |       |
| act gag ctc atg tcc ggc atg ctg ctg ggc ttt gta ttt gta ctt agc     |     |     | 14578 |
| Thr Glu Leu Met Ser Gly Met Leu Leu Gly Phe Val Phe Val Leu Ser     |     |     |       |
| 700   | 705 | 710 |       |
| cac aat ggg atg gag gtt tat aat tcg tct aaa gaa ttc gtg agt gca     |     |     | 14626 |
| His Asn Gly Met Glu Val Tyr Asn Ser Ser Lys Glu Phe Val Ser Ala     |     |     |       |
| 715   | 720 | 725 |       |
| cag atc gta tcc aca cgg gat atc aaa gga aac ata ttc aac gac tgg     |     |     | 14674 |
| Gln Ile Val Ser Thr Arg Asp Ile Lys Gly Asn Ile Phe Asn Asp Trp     |     |     |       |
| 730   | 735 | 740 |       |
| ttc act ggt ggc ctt aac agg caa ata gag cat cat ctt ttc cca aca     |     |     | 14722 |
| Phe Thr Gly Gly Leu Asn Arg Gln Ile Glu His His Leu Phe Pro Thr     |     |     |       |
| 745   | 750 | 755 | 760   |
| atg ccc agg cat aat tta aac aaa ata gca cct aga gtg gag gtg ttc     |     |     | 14770 |
| Met Pro Arg His Asn Leu Asn Lys Ile Ala Pro Arg Val Glu Val Phe     |     |     |       |
| 765   | 770 | 775 |       |
| tgt aag aaa cac ggt ctg gtg tac gaa gac gta tct att gct acc ggc     |     |     | 14818 |
| Cys Lys Lys His Gly Leu Val Tyr Glu Asp Val Ser Ile Ala Thr Gly     |     |     |       |
| 780   | 785 | 790 |       |
| act tgc aag gtt ttg aaa gca ttg aag gaa gtc gcg gag gct gcg gca     |     |     | 14866 |
| Thr Cys Lys Val Leu Lys Ala Leu Lys Glu Val Ala Glu Ala Ala Ala     |     |     |       |
| 795   | 800 | 805 |       |
| gag cag cat gct acc acc agt taa gctagcgtta accctgcttt aatgagatat    |     |     | 14920 |
| Glu Gln His Ala Thr Thr Ser   |     |     |       |
| 810   | 815 |     |       |
| gcgagacgcc tatgatcgca tgatatattgc tttcaattct gttgtgcacg ttgtaaaaaa  |     |     | 14980 |
| cctgagcatg tgtagctcag atccttaccg ccggtttcgg ttcatttctaa tgaatatatc  |     |     | 15040 |
| accggttact atcgtatattt tatgaataat attctccgtt caattttactg attgtccgtc |     |     | 15100 |
| gagcaaattt acacattgcc actaaacgtc taaacccttg taattttgttt ttgttttact  |     |     | 15160 |
| atgtgtgtta tgtatttgat ttgcgataaa tttttatatt tgggtactaaa tttataacac  |     |     | 15220 |
| cttttatgct aacgtttgcc aacacttagc aattttgcaag ttgattaatt gattctaaat  |     |     | 15280 |
| tatttttgtc ttctaaatac atatactaata caactggaaa tgtaaatatt tgctaataat  |     |     | 15340 |
| tctactatag gagaattaaa gtgagtgaat atggtaccac aaggtttgga gatttaattg   |     |     | 15400 |



|  |       |
|--|-------|
| ttgcaatgct gcatggatgg catatacacc aaacattcaa taattcttga ggataataat  | 15460 |
| ggtaccacac aagatttgag gtgcatgaac gtcacgtgga caaaagggtt agtaattttt  | 15520 |
| caagacaaca atgttaccac acacaagttt tgaggtgcat gcatggatgc cctgtggaaa  | 15580 |
| gtttaaaaat attttgaaa tgatttgcac ggaagccatg tgtaaaacca tgacatccac   | 15640 |
| ttggaggatg caataatgaa gaaaactaca aattttacatg caactagtta tgcatttagt | 15700 |
| ctatataatg aggtatttgc aatacttttca ttcatacaca ctcactaagt tttacacgat | 15760 |
| tataatttct tcatagccag cagatctaaa atg gct ccg gat gcg gat aag ctt   | 15814 |
| Met Ala Pro Asp Ala Asp Lys Leu                                    |       |
| 820  |       |
| cga caa cgc cag acg act gcg gta gcg aag cac aat gct gct acc ata    | 15862 |
| Arg Gln Arg Gln Thr Thr Ala Val Ala Lys His Asn Ala Ala Thr Ile    |       |
| 825 830 835  |       |
| tcg acg cag gaa cgc ctt tgc agt ctg tct tcg ctc aaa ggc gaa gaa    | 15910 |
| Ser Thr Gln Glu Arg Leu Cys Ser Leu Ser Ser Leu Lys Gly Glu Glu    |       |
| 840 845 850 855  |       |
| gtc tgc atc gac gga atc atc tat gac ctc caa tca ttc gat cat ccc    | 15958 |
| Val Cys Ile Asp Gly Ile Ile Tyr Asp Leu Gln Ser Phe Asp His Pro    |       |
| 860 865 870  |       |
| ggg ggt gaa acg atc aaa atg ttt ggt ggc aac gat gtc act gta cag    | 16006 |
| Gly Gly Glu Thr Ile Lys Met Phe Gly Gly Asn Asp Val Thr Val Gln    |       |
| 875 880 885  |       |
| tac aag atg att cac ccg tac cat acc gag aag cat ttg gaa aag atg    | 16054 |
| Tyr Lys Met Ile His Pro Tyr His Thr Glu Lys His Leu Glu Lys Met    |       |
| 890 895 900  |       |
| aag cgt gtc ggc aag gtg acg gat ttc gtc tgc gag tac aag ttc gat    | 16102 |
| Lys Arg Val Gly Lys Val Thr Asp Phe Val Cys Glu Tyr Lys Phe Asp    |       |
| 905 910 915  |       |
| acc gaa ttt gaa cgc gaa atc aaa cga gaa gtc ttc aag att gtg cga    | 16150 |
| Thr Glu Phe Glu Arg Glu Ile Lys Arg Glu Val Phe Lys Ile Val Arg    |       |
| 920 925 930 935  |       |
| cga ggc aag gat ttc ggt act ttg gga tgg ttc ttc cgt gcg ttt tgc    | 16198 |
| Arg Gly Lys Asp Phe Gly Thr Leu Gly Trp Phe Phe Arg Ala Phe Cys    |       |
| 940 945 950  |       |
| tac att gcc att ttc ttc tac ctg cag tac cat tgg gtc acc acg gga    | 16246 |
| Tyr Ile Ala Ile Phe Phe Tyr Leu Gln Tyr His Trp Val Thr Thr Gly    |       |
| 955 960 965  |       |
| acc tct tgg ctg ctg gcc gtg gcc tac gga atc tcc caa gcg atg att    | 16294 |
| Thr Ser Trp Leu Leu Ala Val Ala Tyr Gly Ile Ser Gln Ala Met Ile    |       |
| 970 975 980  |       |
| ggc atg aat gtc cag cac gat gcc aac cac ggg gcc acc tcc aag cgt    | 16342 |
| Gly Met Asn Val Gln His Asp Ala Asn His Gly Ala Thr Ser Lys Arg    |       |
| 985 990 995  |       |
| ccc tgg gtc aac gac atg cta ggc ctc ggt gcg gat ttt att ggt        | 16387 |
| Pro Trp Val Asn Asp Met Leu Gly Leu Gly Ala Asp Phe Ile Gly        |       |
| 1000 1005 1010   |       |
| ggt tcc aag tgg ctc tgg cag gaa caa cac tgg acc cac cac gct        | 16432 |
| Gly Ser Lys Trp Leu Trp Gln Glu Gln His Trp Thr His His Ala        |       |
| 1015 1020 1025   |       |
| tac acc aat cac gcc gag atg gat ccc gat agc ttt ggt gcc gaa        | 16477 |
| Tyr Thr Asn His Ala Glu Met Asp Pro Asp Ser Phe Gly Ala Glu        |       |
| 1030 1035 1040   |       |
| cca atg ctc cta ttc aac gac tat ccc ttg gat cat ccc gct cgt        | 16522 |
| Pro Met Leu Leu Phe Asn Asp Tyr Pro Leu Asp His Pro Ala Arg        |       |
| 1045 1050 1055   |       |
| acc tgg cta cat cgc ttt caa gca ttc ttt tac atg ccc gtc ttg        | 16567 |
| Thr Trp Leu His Arg Phe Gln Ala Phe Phe Tyr Met Pro Val Leu        |       |
| 1060 1065 1070   |       |

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gct gga tac tgg ttg tcc gct gtc ttc aat cca caa att ctt gac 16612
Ala Gly Tyr Trp Leu Ser Ala Val Phe Asn Pro Gln Ile Leu Asp
1075 1080 1085
ctc cag caa cgc ggc gca ctt tcc gtc ggt atc cgt ctc gac aac 16657
Leu Gln Gln Arg Gly Ala Leu Ser Val Gly Ile Arg Leu Asp Asn
1090 1095 1100
gct ttc att cac tcg cga cgc aag tat gcg gtt ttc tgg cgg gct 16702
Ala Phe Ile His Ser Arg Arg Lys Tyr Ala Val Phe Trp Arg Ala
1105 1110 1115
gtg tac att gcg gtg aac gtg att gct ccg ttt tac aca aac tcc 16747
Val Tyr Ile Ala Val Asn Val Ile Ala Pro Phe Tyr Thr Asn Ser
1120 1125 1130
ggc ctc gaa tgg tcc tgg cgt gtc ttt gga aac atc atg ctc atg 16792
Gly Leu Glu Trp Ser Trp Arg Val Phe Gly Asn Ile Met Leu Met
1135 1140 1145
ggg gtg gcg gaa tcg ctc gcg ctg gcg gtc ctg ttt tcg ttg tcg 16837
Gly Val Ala Glu Ser Leu Ala Leu Ala Val Leu Phe Ser Leu Ser
1150 1155 1160
cac aat ttc gaa tcc gcg gat cgc gat ccg acc gcc cca ctg aaa 16882
His Asn Phe Glu Ser Ala Asp Arg Asp Pro Thr Ala Pro Leu Lys
1165 1170 1175
aag acg gga gaa cca gtc gac tgg ttc aag aca cag gtc gaa act 16927
Lys Thr Gly Glu Pro Val Asp Trp Phe Lys Thr Gln Val Glu Thr
1180 1185 1190
tcc tgc act tac ggt gga ttc ctt tcc ggt tgc ttc acg gga ggt 16972
Ser Cys Thr Tyr Gly Gly Phe Leu Ser Gly Cys Phe Thr Gly Gly
1195 1200 1205
ctc aac ttt cag gtt gaa cac cac ttg ttc cca cgc atg agc agc 17017
Leu Asn Phe Gln Val Glu His His Leu Phe Pro Arg Met Ser Ser
1210 1215 1220
gct tgg tat ccc tac att gcc ccc aag gtc cgc gaa att tgc gcc 17062
Ala Trp Tyr Pro Tyr Ile Ala Pro Lys Val Arg Glu Ile Cys Ala
1225 1230 1235
aaa cac ggc gtc cac tac gcc tac tac ccg tgg atc cac caa aac 17107
Lys His Gly Val His Tyr Ala Tyr Tyr Pro Trp Ile His Gln Asn
1240 1245 1250
ttt ctc tcc acc gtc cgc tac atg cac gcg gcc ggg acc ggt gcc 17152
Phe Leu Ser Thr Val Arg Tyr Met His Ala Ala Gly Thr Gly Ala
1255 1260 1265
aac tgg cgc cag atg gcc aga gaa aat ccc ttg acc gga cgg gcg 17197
Asn Trp Arg Gln Met Ala Arg Glu Asn Pro Leu Thr Gly Arg Ala
1270 1275 1280
taa agatctgccg gcacgatcc cgggccatgg cctgctttaa tgagatatgc 17250
gagacgccta tgatcgcgatg atatttgctt tcaattctgt tgtgcacggtt gtaaaaaacc 17310
tgagcatgtg tagctcagat ccttaccgcc ggtttcggtt cattctaattg aatatatcac 17370
ccgttactat cgtatttttta tgaataatat tctccgttca atttactgat tgtccgtcga 17430
cgagctcggc gcgcctctag aggatcgatg aattcagatc ggctgagtgg ctccttcaac 17490
gttgccggttc tgtcagttcc aaacgtaaaa cggcttgcgc cgcgtcatcg gcgggggtca 17550
taacgtgact cccttaattc tccgctcatg atcagattgt cgtttcccgcc cttcagttta 17610
aactatcagt gtttgacagg atatattggc gggtaaacct aagagaaaaag agcgttttatt 17670
agaataatcg gatattttaaa agggcgtgaa aagggtttatc cttcgtccat ttgtatgtgc 17730
atgccaaacca cagggttccc ca 17752

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<210> 57

<211> 290

<212> PRT

<213> *Phaeodactylum tricornutum*, *Physcomitrella patens*

<400> 57

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Met Glu Val Val Glu Arg Phe Tyr Gly Glu Leu Asp Gly Lys Val Ser
1          5          10          15
Gln Gly Val Asn Ala Leu Leu Gly Ser Phe Gly Val Glu Leu Thr Asp
          20          25          30
Thr Pro Thr Thr Lys Gly Leu Pro Leu Val Asp Ser Pro Thr Pro Ile
          35          40          45
Val Leu Gly Val Ser Val Tyr Leu Thr Ile Val Ile Gly Gly Leu Leu
          50          55          60
Trp Ile Lys Ala Arg Asp Leu Lys Pro Arg Ala Ser Glu Pro Phe Leu
65          70          75          80
Leu Gln Ala Leu Val Leu Val His Asn Leu Phe Cys Phe Ala Leu Ser
          85          90          95
Leu Tyr Met Cys Val Gly Ile Ala Tyr Gln Ala Ile Thr Trp Arg Tyr
          100          105          110
Ser Leu Trp Gly Asn Ala Tyr Asn Pro Lys His Lys Glu Met Ala Ile
          115          120          125
Leu Val Tyr Leu Phe Tyr Met Ser Lys Tyr Val Glu Phe Met Asp Thr
          130          135          140
Val Ile Met Ile Leu Lys Arg Ser Thr Arg Gln Ile Ser Phe Leu His
145          150          155          160
Val Tyr His His Ser Ser Ile Ser Leu Ile Trp Trp Ala Ile Ala His
          165          170          175
His Ala Pro Gly Gly Glu Ala Tyr Trp Ser Ala Ala Leu Asn Ser Gly
          180          185          190
Val His Val Leu Met Tyr Ala Tyr Tyr Phe Leu Ala Ala Cys Leu Arg
          195          200          205
Ser Ser Pro Lys Leu Lys Asn Lys Tyr Leu Phe Trp Gly Arg Tyr Leu
          210          215          220
Thr Gln Phe Gln Met Phe Gln Phe Met Leu Asn Leu Val Gln Ala Tyr
225          230          235          240
Tyr Asp Met Lys Thr Asn Ala Pro Tyr Pro Gln Trp Leu Ile Lys Ile
          245          250          255
Leu Phe Tyr Tyr Met Ile Ser Leu Leu Phe Leu Phe Gly Asn Phe Tyr
          260          265          270
Val Gln Lys Tyr Ile Lys Pro Ser Asp Gly Lys Gln Lys Gly Ala Lys
          275          280          285
Thr Glu
          290

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<210> 58

<211> 525

<212> PRT

<213> *Phaeodactylum tricornutum*, *Physcomitrella patens*

<400> 58

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Met Val Phe Ala Gly Gly Gly Leu Gln Gln Gly Ser Leu Glu Glu Asn
1          5          10          15
Ile Asp Val Glu His Ile Ala Ser Met Ser Leu Phe Ser Asp Phe Phe
          20          25          30
Ser Tyr Val Ser Ser Thr Val Gly Ser Trp Ser Val His Ser Ile Gln
          35          40          45

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|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |  |  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Pro | Leu | Lys | Arg | Leu | Thr | Ser | Lys | Lys | Arg | Val | Ser | Glu | Ser | Ala | Ala |  |  |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |  |  |
| Val | Gln | Cys | Ile | Ser | Ala | Glu | Val | Gln | Arg | Asn | Ser | Ser | Thr | Gln | Gly |  |  |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |  |  |
| Thr | Ala | Glu | Ala | Leu | Ala | Glu | Ser | Val | Val | Lys | Pro | Thr | Arg | Arg | Arg |  |  |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |  |  |
| Ser | Ser | Gln | Trp | Lys | Lys | Ser | Thr | His | Pro | Leu | Ser | Glu | Val | Ala | Val |  |  |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |  |  |
| His | Asn | Lys | Pro | Ser | Asp | Cys | Trp | Ile | Val | Val | Lys | Asn | Lys | Val | Tyr |  |  |
|     | 115 |     |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |  |  |
| Asp | Val | Ser | Asn | Phe | Ala | Asp | Glu | His | Pro | Gly | Gly | Ser | Val | Ile | Ser |  |  |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |  |  |
| Thr | Tyr | Phe | Gly | Arg | Asp | Gly | Thr | Asp | Val | Phe | Ser | Ser | Phe | His | Ala |  |  |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |  |  |
| Ala | Ser | Thr | Trp | Lys | Ile | Leu | Gln | Asp | Phe | Tyr | Ile | Gly | Asp | Val | Glu |  |  |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |  |  |
| Arg | Val | Glu | Pro | Thr | Pro | Glu | Leu | Leu | Lys | Asp | Phe | Arg | Glu | Met | Arg |  |  |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |  |  |
| Ala | Leu | Phe | Leu | Arg | Glu | Gln | Leu | Phe | Lys | Ser | Ser | Lys | Leu | Tyr | Tyr |  |  |
|     | 195 |     |     |     |     | 200 |     |     |     |     |     | 205 |     |     |     |  |  |
| Val | Met | Lys | Leu | Leu | Thr | Asn | Val | Ala | Ile | Phe | Ala | Ala | Ser | Ile | Ala |  |  |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |  |  |
| Ile | Ile | Cys | Trp | Ser | Lys | Thr | Ile | Ser | Ala | Val | Leu | Ala | Ser | Ala | Cys |  |  |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |  |  |
| Met | Met | Ala | Leu | Cys | Phe | Gln | Gln | Cys | Gly | Trp | Leu | Ser | His | Asp | Phe |  |  |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |  |  |
| Leu | His | Asn | Gln | Val | Phe | Glu | Thr | Arg | Trp | Leu | Asn | Glu | Val | Val | Gly |  |  |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |  |  |
| Tyr | Val | Ile | Gly | Asn | Ala | Val | Leu | Gly | Phe | Ser | Thr | Gly | Trp | Trp | Lys |  |  |
|     | 275 |     |     |     |     | 280 |     |     |     |     |     | 285 |     |     |     |  |  |
| Glu | Lys | His | Asn | Leu | His | His | Ala | Ala | Pro | Asn | Glu | Cys | Asp | Gln | Thr |  |  |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |  |  |
| Tyr | Gln | Pro | Ile | Asp | Glu | Asp | Ile | Asp | Thr | Leu | Pro | Leu | Ile | Ala | Trp |  |  |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |  |  |
| Ser | Lys | Asp | Ile | Leu | Ala | Thr | Val | Glu | Asn | Lys | Thr | Phe | Leu | Arg | Ile |  |  |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |  |  |
| Leu | Gln | Tyr | Gln | His | Leu | Phe | Phe | Met | Gly | Leu | Leu | Phe | Phe | Ala | Arg |  |  |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |  |  |
| Gly | Ser | Trp | Leu | Phe | Trp | Ser | Trp | Arg | Tyr | Thr | Ser | Thr | Ala | Val | Leu |  |  |
|     | 355 |     |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |  |  |
| Ser | Pro | Val | Asp | Arg | Leu | Leu | Glu | Lys | Gly | Thr | Val | Leu | Phe | His | Tyr |  |  |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |  |  |
| Phe | Trp | Phe | Val | Gly | Thr | Ala | Cys | Tyr | Leu | Leu | Pro | Gly | Trp | Lys | Pro |  |  |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |  |  |
| Leu | Val | Trp | Met | Ala | Val | Thr | Glu | Leu | Met | Ser | Gly | Met | Leu | Leu | Gly |  |  |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |  |  |
| Phe | Val | Phe | Val | Leu | Ser | His | Asn | Gly | Met | Glu | Val | Tyr | Asn | Ser | Ser |  |  |
|     | 420 |     |     |     |     |     |     | 425 |     |     |     |     | 430 |     |     |  |  |
| Lys | Glu | Phe | Val | Ser | Ala | Gln | Ile | Val | Ser | Thr | Arg | Asp | Ile | Lys | Gly |  |  |
|     | 435 |     |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |  |  |
| Asn | Ile | Phe | Asn | Asp | Trp | Phe | Thr | Gly | Gly | Leu | Asn | Arg | Gln | Ile | Glu |  |  |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |  |  |
| His | His | Leu | Phe | Pro | Thr | Met | Pro | Arg | His | Asn | Leu | Asn | Lys | Ile | Ala |  |  |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |  |  |
| Pro | Arg | Val | Glu | Val | Phe | Cys | Lys | Lys | His | Gly | Leu | Val | Tyr | Glu | Asp |  |  |
|     |     |     | 485 |     |     |     |     |     | 490 |     |     |     |     | 495 |     |  |  |
| Val | Ser | Ile | Ala | Thr | Gly | Thr | Cys | Lys | Val | Leu | Lys | Ala | Leu | Lys | Glu |  |  |

|     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     | 500 |     | 505 |     | 510 |     |     |     |     |     |     |     |
| Val | Ala | Glu | Ala | Ala | Ala | Glu | Gln | His | Ala | Thr | Thr | Ser |
|     | 515 |     |     |     |     | 520 |     |     |     |     |     | 525 |

&lt;210&gt; 59

&lt;211&gt; 469

&lt;212&gt; PRT

<213> *Phaeodactylum tricornutum*, *Physcomitrella patens*

&lt;400&gt; 59

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ala | Pro | Asp | Ala | Asp | Lys | Leu | Arg | Gln | Arg | Gln | Thr | Thr | Ala | Val |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ala | Lys | His | Asn | Ala | Ala | Thr | Ile | Ser | Thr | Gln | Glu | Arg | Leu | Cys | Ser |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Leu | Ser | Ser | Leu | Lys | Gly | Glu | Glu | Val | Cys | Ile | Asp | Gly | Ile | Ile | Tyr |
|     |     | 35  |     |     |     | 40  |     |     |     |     |     | 45  |     |     |     |
| Asp | Leu | Gln | Ser | Phe | Asp | His | Pro | Gly | Gly | Glu | Thr | Ile | Lys | Met | Phe |
|     | 50  |     |     |     | 55  |     |     |     |     |     | 60  |     |     |     |     |
| Gly | Gly | Asn | Asp | Val | Thr | Val | Gln | Tyr | Lys | Met | Ile | His | Pro | Tyr | His |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Thr | Glu | Lys | His | Leu | Glu | Lys | Met | Lys | Arg | Val | Gly | Lys | Val | Thr | Asp |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Phe | Val | Cys | Glu | Tyr | Lys | Phe | Asp | Thr | Glu | Phe | Glu | Arg | Glu | Ile | Lys |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Arg | Glu | Val | Phe | Lys | Ile | Val | Arg | Arg | Gly | Lys | Asp | Phe | Gly | Thr | Leu |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Gly | Trp | Phe | Phe | Arg | Ala | Phe | Cys | Tyr | Ile | Ala | Ile | Phe | Phe | Tyr | Leu |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Gln | Tyr | His | Trp | Val | Thr | Gly | Thr | Ser | Trp | Leu | Leu | Ala | Val | Ala |     |
| 145 |     |     |     |     | 150 |     |     |     | 155 |     |     |     |     | 160 |     |
| Tyr | Gly | Ile | Ser | Gln | Ala | Met | Ile | Gly | Met | Asn | Val | Gln | His | Asp | Ala |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Asn | His | Gly | Ala | Thr | Ser | Lys | Arg | Pro | Trp | Val | Asn | Asp | Met | Leu | Gly |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Leu | Gly | Ala | Asp | Phe | Ile | Gly | Gly | Ser | Lys | Trp | Leu | Trp | Gln | Glu | Gln |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| His | Trp | Thr | His | His | Ala | Tyr | Thr | Asn | His | Ala | Glu | Met | Asp | Pro | Asp |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Ser | Phe | Gly | Ala | Glu | Pro | Met | Leu | Leu | Phe | Asn | Asp | Tyr | Pro | Leu | Asp |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| His | Pro | Ala | Arg | Thr | Trp | Leu | His | Arg | Phe | Gln | Ala | Phe | Phe | Tyr | Met |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Pro | Val | Leu | Ala | Gly | Tyr | Trp | Leu | Ser | Ala | Val | Phe | Asn | Pro | Gln | Ile |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Leu | Asp | Leu | Gln | Gln | Arg | Gly | Ala | Leu | Ser | Val | Gly | Ile | Arg | Leu | Asp |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Asn | Ala | Phe | Ile | His | Ser | Arg | Arg | Lys | Tyr | Ala | Val | Phe | Trp | Arg | Ala |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Val | Tyr | Ile | Ala | Val | Asn | Val | Ile | Ala | Pro | Phe | Tyr | Thr | Asn | Ser | Gly |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Leu | Glu | Trp | Ser | Trp | Arg | Val | Phe | Gly | Asn | Ile | Met | Leu | Met | Gly | Val |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Ala | Glu | Ser | Leu | Ala | Leu | Ala | Val | Leu | Phe | Ser | Leu | Ser | His | Asn | Phe |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Glu | Ser | Ala | Asp | Arg | Asp | Pro | Thr | Ala | Pro | Leu | Lys | Lys | Thr | Gly | Glu |

```

      355              360              365
Pro Val Asp Trp Phe Lys Thr Gln Val Glu Thr Ser Cys Thr Tyr Gly
      370              375              380
Gly Phe Leu Ser Gly Cys Phe Thr Gly Gly Leu Asn Phe Gln Val Glu
385              390              395              400
His His Leu Phe Pro Arg Met Ser Ser Ala Trp Tyr Pro Tyr Ile Ala
      405              410              415
Pro Lys Val Arg Glu Ile Cys Ala Lys His Gly Val His Tyr Ala Tyr
      420              425              430
Tyr Pro Trp Ile His Gln Asn Phe Leu Ser Thr Val Arg Tyr Met His
      435              440              445
Ala Ala Gly Thr Gly Ala Asn Trp Arg Gln Met Ala Arg Glu Asn Pro
      450              455              460
Leu Thr Gly Arg Ala
465

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<210> 60

<211> 26

<212> DNA

<213> unknown

<220>

<223> primer

<220>

<221> misc\_feature

<222> (1)..(26)

<223> primer

<400> 60

gaattcggcg cgccgagctc ctcgag

26

<210> 61

<211> 265

<212> DNA

<213> unknown

<220>

<223> primer

<220>

<221> misc\_feature

<222> (1)..(265)

<223> primer

<400> 61

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ccaccgcggt gggcggccgc ctgcagtcta gaaggcctcc tgctttaatg agatatgcga      60
gacgcctatg atcgcatgat atttgctttc aattctgttg tgcacgttgt aaaaaacctg      120
agcatgtgta gctcagatcc ttaccgccgg ttctcggttca ttctaatagaa tatatcaccc      180
gttactatcg tatttttatg aataatatcc tccgttcaat ttactgattg tccgtcgacg      240
aattcgagct cggcgcgcca agctt                                     265

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<210> 62

<211> 257  
 <212> DNA  
 <213> unknown

<220>  
 <223> primer

<220>  
 <221> misc\_feature  
 <222> (1)..(257)  
 <223> primer

<400> 62

|             |            |            |            |            |            |     |
|-------------|------------|------------|------------|------------|------------|-----|
| ggatccgata  | tcggggccgc | tagcgttaac | cctgctttaa | tgagatatgc | gagacgccta | 60  |
| tgatcgcgatg | atatttgctt | tcaattctgt | tgtgcacggt | gtaaaaaacc | tgagcatgtg | 120 |
| tagctcagat  | ccttaccgcc | ggtttcgggt | cattctaata | aatatatcac | ccgttactat | 180 |
| cgtattttta  | tgaataatat | tctccgttca | atttactgat | tgtccgtcga | cgaattcgag | 240 |
| ctcggcgcgc  | caagctt    |            |            |            |            | 257 |

<210> 63

<211> 5410  
 <212> DNA  
 <213> unknown

<220>  
 <223> primer

<220>  
 <221> misc\_feature  
 <222> (1)..(5410)  
 <223> Plant expression vector

<400> 63

|             |             |            |             |             |             |      |
|-------------|-------------|------------|-------------|-------------|-------------|------|
| ttttggaaat  | gatttgcgatg | gaagccatgt | gtaaaaccat  | gacatccact  | tgaggatgc   | 60   |
| aataatgaag  | aaaactacaa  | atttacatgc | aactagttat  | gcatgtagtc  | tatataatga  | 120  |
| ggattttgca  | atactttcat  | tcatacacac | tcactaagtt  | ttacacgatt  | ataatttctt  | 180  |
| catagccagc  | ggatccgata  | tcggggccgc | tagcgttaac  | cctgctttaa  | tgagatatgc  | 240  |
| gagacgccta  | tgatcgcgatg | atatttgctt | tcaattctgt  | tgtgcacggt  | gtaaaaaacc  | 300  |
| tgagcatgtg  | tagctcagat  | ccttaccgcc | ggtttcgggt  | cattctaata  | aatatatcac  | 360  |
| ccgttactat  | cgtattttta  | tgaataatat | tctccgttca  | atttactgat  | tgtccgtcga  | 420  |
| gcaaattttac | acattgccac  | taaacgtcta | aacccttgta  | atttgttttt  | gttttactat  | 480  |
| gtgtgttatg  | tatttgattt  | gcgataaatt | tttatatttg  | gtactaaatt  | tataaacact  | 540  |
| tttatgctaa  | cgtttgccaa  | cacttagcaa | tttgcaagtt  | gattaattga  | ttctaaatta  | 600  |
| tttttgcctt  | ctaaatacat  | atactaata  | actggaaatg  | taaatatttg  | ctaataatttc | 660  |
| tactatagga  | gaattaaagt  | gagtgaatat | ggttaccacaa | ggtttgagga  | tttaattggt  | 720  |
| gcaatgctgc  | atggatggca  | tatacaccaa | acattcaata  | attccttgagg | ataataatgg  | 780  |
| taccacacaa  | gatttgaggt  | gcatgaacgt | cacgtggaca  | aaaggtttag  | taatttttca  | 840  |
| agacaacaat  | gttaccacac  | acaagttttg | aggtgcatgc  | atggatgcc   | tgtggaaagt  | 900  |
| ttaaaaatat  | tttggaaatg  | atttgcgatg | aagccatgtg  | taaaaccatg  | acatccactt  | 960  |
| ggaggatgca  | ataatgaaga  | aaaactacaa | tttacatgca  | actagttatg  | catgtagtct  | 1020 |
| atataatgag  | gattttgcaa  | tactttcatt | catacacact  | cactaagttt  | tacacgatta  | 1080 |
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| atataatcacc | cggtactatc  | gtatttttat  | gaataatatt  | ctccgttcaa  | tttactgatt | 1320 |
| gtccgtcgac  | gagctcggcg  | cgccaagctt  | ggcgtaatca  | tggatcatagc | tgtttcctgt | 1380 |
| gtgaaattgt  | tatccgctca  | caattccaca  | caacatacga  | gccggaagca  | taaagtgtaa | 1440 |
| agcctggggg  | gcctaataag  | tgagctaact  | cacattaatt  | gcgttgcgct  | cactgccgcg | 1500 |
| tttccagtcg  | ggaaacctgt  | cggtccagct  | gcattaatga  | atcggccaac  | gcgcggggag | 1560 |
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| atcaggggat  | aacgcaggaa  | agaacatgtg  | agcaaaaggc  | cagcaaaagg  | ccaggaaccg | 1740 |
| taaaaaggcc  | gcgttgctgg  | cgtttttcca  | taggtccgcg  | ccccctgacg  | agcatcacaa | 1800 |
| aaatcgacgc  | tcaagtcaga  | ggtggcgaaa  | cccgcagaga  | ctataaagat  | accaggcggt | 1860 |
| tccccctgga  | agctccctcg  | tgcgctctcc  | tgttccgacc  | ctgccgctta  | ccgataacct | 1920 |
| gtccgccttt  | ctcccttcgg  | gaagcgtggc  | gctttctcat  | agctcacgct  | gtaggatatc | 1980 |
| cagttcggtg  | taggtcggtt  | gctccaagct  | gggtgtgtg   | cacgaacccc  | ccgttcagcc | 2040 |
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| ccaacactta  | gcaattttgca | agttgattaa  | ttgattctaa  | attatttttg  | tcttctaaat | 4200 |
| acataacta   | atcaactgga  | aatgtaaata  | tttgctaata  | tttctactat  | aggagaatta | 4260 |
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| acacacaagt  | tttgaggtgc  | atgcatggat  | gccctgtgga  | aagtttaaaa  | atattttgga | 4500 |
| aatgatttgc  | atggaagcca  | tgtgtaaaac  | catgacatcc  | acttgaggga  | tgcaataatg | 4560 |



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| gcaatacttt  | cattcataca  | cactcactaa  | gttttacacg  | attataattt  | cttcatagcc | 4680 |
| agcccaccgc  | ggtgggcggc  | cgctgcagt   | ctagaaggcc  | tcctgcttta  | atgagatatg | 4740 |
| cgagacgcct  | atgatcgcat  | gatatttgct  | ttcaattctg  | ttgtgcacgt  | tgtaaaaaac | 4800 |
| ctgagcatgt  | gtagctcaga  | tccttaccgc  | cggtttcggt  | tcattctaata | gaatatatca | 4860 |
| cccgttacta  | tcgtattttt  | atgaataata  | ttctccggtc  | aattttactga | ttgtccgctg | 4920 |
| agcaaattta  | cacattgccca | ctaaacgtct  | aaacccttgt  | aattttgtttt | tgttttacta | 4980 |
| tgtgtgttat  | gtatttgatt  | tgcgataaat  | ttttatatatt | ggtactaaat  | ttataacacc | 5040 |
| ttttatgcta  | acgtttgccca | acacttagca  | atgttgcaagt | tgattaattg  | attctaaatt | 5100 |
| atttttgtct  | tctaaataca  | tataactaatc | aactggaaat  | gtaaataat   | gctaataatt | 5160 |
| ctactatagg  | agaattaaaag | tgagtgaata  | tggtaccaca  | aggtttgag   | atttaattgt | 5220 |
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| aagacaacaa  | tgttaccaca  | cacaagtttt  | gaggtgcatg  | catggatgcc  | ctgtggaaag | 5400 |
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<223> Plant expression vector

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| gcgcccagca  | caggtgcgca  | ggcaaattgc | accaacgcac | acagcgccag  | cagaatgccca | 120  |
| tagtgggcgg  | tgacgtcggt  | cgagtgaacc | agatcgcgca | ggaggcccg   | cagcacccgc  | 180  |
| ataatcaggc  | cgatgccgac  | agcgtcgagc | gcgacagtgc | tcagaattac  | gatcaggggt  | 240  |
| atgttgggtt  | tcacgtctgg  | cctccggacc | agcctccgct | ggtccgattg  | aacgcgcgga  | 300  |
| ttctttatca  | ctgataagtt  | ggtggacata | ttatgtttat | cagtgataaa  | gtgtcaagca  | 360  |
| tgacaaagtt  | gcagccgaat  | acagtgatcc | gtgccgccct | ggacctgttg  | aacgaggtcg  | 420  |
| gcgtagacgg  | tctgacgaca  | cgcaaactgg | cggaacggtt | gggggttcag  | cagccggcgc  | 480  |
| ttactggca   | cttcaggaac  | aagcgggcgc | tgctcgacgc | actggccgaa  | gccatgctgg  | 540  |
| cggagaatca  | tacgcattcg  | gtgccgagag | ccgacgacga | ctggcgctca  | tttctgatcg  | 600  |
| ggaatgccc   | cagcttcagg  | caggcgctgc | tcgcctaccg | cgatggcgcg  | cgcattccatg | 660  |
| ccggcacgcg  | accgggcgca  | ccgcagatgg | aaacggccga | cgcgacgctt  | cgcttccctct | 720  |
| gcgaggcggg  | tttttcggcc  | ggggacgccg | tcaatgcgct | gatgacaatc  | agctacttca  | 780  |
| ctgttggggc  | cgtgcttgag  | gagcaggccg | gcgacagcga | tgccggcgag  | cgcggcgcca  | 840  |
| ccgttgaaca  | ggctccgctc  | tcgccgctgt | tgccggccgc | gatagacgcc  | ttcgacgaag  | 900  |
| ccggtccgga  | cgcagcgttc  | gagcagggac | tcgcggtgat | tgctcgatgga | ttggcgaaaa  | 960  |
| ggaggctcgt  | tgtaaggaaac | gttgaaggac | cgagaaaggg | tgacgattga  | tcaggacgcg  | 1020 |
| tgccggagcg  | caaccacatc  | actacagcag | agccatgtag | acaacatccc  | ctcccccttt  | 1080 |
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| ccgccccctt  | gacgagcatc  | acaaaaatcg | acgctcaagt | cagaggtggc  | gaaacccgac  | 1440 |
| aggactataa  | agataccagg  | cgtttccccc | tggaagctcc | ctcgtgcgct  | ctcctgttcc  | 1500 |

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| ctaccgccgg  | cgtaacagat  | gagggcaagc  | ggatggctga  | tgaaaccaag  | ccaaccagga | 1860 |
| agggcgagccc | acctatcaag  | gtgtactgcc  | ttccagacga  | acgaagagcg  | attgaggaaa | 1920 |
| agggcgccggc | ggccggcatg  | agcctgtcgg  | cctacctgct  | ggccgtcggc  | cagggctaca | 1980 |
| aaatcacggg  | cgctcgtggac | tatgagcacg  | tccgcgagct  | ggcccgcatc  | aatggcgacc | 2040 |
| tgggcccgcct | gggcggcctg  | ctgaaactct  | ggctcaccga  | cgaccgcgcg  | acggcgcggt | 2100 |
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| ccgctctgcc  | ctgttcacca | cgcgcaacaa | gaaaatcccg  | cgcgaggcg   | tgcaaaaaca  | 6240 |
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| ggcccagcgg  | atgttcgact | atttcagctc | gcaccgggag  | ccgtaccgcg  | tcaagctgga  | 6720 |
| aaccttccgc  | ctcatgtgcg | gatcggattc | caccgcgtg   | aagaagtggc  | gcgagcaggt  | 6780 |
| cggcgaagcc  | tgcgaagagt | tgcgaggcag | cggcctggtg  | gaacacgcct  | gggtcaatga  | 6840 |
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| tcgctattct  | ggagcttggt | gtttatttct | gtctaccgcc  | tgccgggcgg  | ggtcgcggcg  | 7500 |
| acggtaggcg  | ctgtgcagcc | gctgatggtc | gtgttcattc  | ctgccgctct  | gctaggtagc  | 7560 |
| ccgatacgat  | tgatggcggt | cctgggggct | atttgcgga   | ctgcgggcgt  | ggcgctggtg  | 7620 |
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| acagttgttt  | ccttactggg | ctttctcagc | cccagatctg  | gggtcgatca  | gccggggatg  | 7980 |
| catcaggccg  | acagtcggaa | cttcgggtcc | ccgacctgta  | ccattcgggtg | agcaatggat  | 8040 |
| aggggagttg  | atatcgtcaa | cgttcacttc | taaagaaata  | gcgccactca  | gcttcctcag  | 8100 |
| cggctttatc  | cagcgatttc | ctattatgtc | ggcatagttc  | tcaagatcga  | cagcctgtca  | 8160 |
| cggttaagcg  | agaaatgaat | aagaaggctg | ataattcgga  | tctctgcgag  | ggagatgata  | 8220 |
| tttgatcaca  | ggcagcaacg | ctctgtcatc | gttacaatca  | acatgctacc  | ctccgcgaga  | 8280 |
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|            |             |            |             |             |             |       |
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| gcctgtatcg | agtgggtgatt | ttgtgccgag | ctgccggctcg | gggagctggt  | ggctggctgg  | 8460  |
| tggcaggata | tattgtggtg  | taaacaaatt | gacgcttaga  | caacttaata  | acacattgcg  | 8520  |
| gacgttttta | atgtactggg  | gtggtttttc | ttttcaccag  | tgagacgggc  | aacagctgat  | 8580  |
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| gaacgtggac | tccaacgtca  | aaggcgaaa  | aaccgtctat  | cagggcgatg  | gcccactacg  | 8820  |
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| tcgggagcgg | cgataccgta  | aagcacgagg | aagcggtcag  | cccattcgcc  | gccaagctct  | 9480  |
| tcagcaatat | cacgggtagc  | caacgctatg | tcctgatagc  | ggtccgccac  | acccagccgg  | 9540  |
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|            |            |             |            |            |            |       |
|------------|------------|-------------|------------|------------|------------|-------|
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| ggcgggggtc | ataacgtgac | tcccttaatt  | ctccgctcat | gatcagattg | tcgtttcccg | 11940 |
| ccttcagttt | aaactatcag | tgtttgacag  | gatataattg | cggttaaacc | taagagaaaa | 12000 |
| gagcgtttat | tagaataatc | ggatatttaa  | aagggcgtga | aaaggtttat | ccttcgtcca | 12060 |
| tttgtatgtg | catgccaacc | acagggttcc  | cca        |            |            | 12093 |

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<211> 12085

<212> DNA

<213> unknown

<220>

<221> misc\_feature

<222> (1)..(12085)

<223> Plant expression vector with a promoter-terminator expression cassette

<400> 65

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| gcgcccagca | caggtgcgca  | ggcaaattgc | accaacgcat | acagcgccag  | cagaatgcc  | 120  |
| tagtgggcgg | tgacgtcggt  | cgagtgaacc | agatcgcgca | ggaggcccg   | cagcaccggc | 180  |
| ataatcaggc | cgatgccgac  | agcgtcgagc | gcgacagtgc | tcagaattac  | gatcaggggt | 240  |
| atgttgggtt | tcacgtctgg  | cctccggacc | agcctccgct | ggtccgattg  | aacgcgcgga | 300  |
| ttctttatca | ctgataagtt  | ggtggacata | ttatgtttat | cagtgataaa  | gtgtcaagca | 360  |
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| gcgtagacgg | tctgacgaca  | cgcaaactgg | cggaacgggt | gggggttcag  | cagccggcgc | 480  |
| tttactggca | cttcaggaac  | aagcgggcgc | tgctcgacgc | actggccgaa  | gccatgctgg | 540  |
| cggagaatca | tacgcattcg  | gtgccgagag | ccgacgacga | ctggcgctca  | tttctgctcg | 600  |
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| ccggcacgcg | accgggcgca  | ccgcagatgg | aaacggccga | cgcgagctt   | cgcttcctct | 720  |
| gcgaggcggg | tttttcggcc  | ggggacgcgc | tcaatgcgct | gatgacaatc  | agctacttca | 780  |
| ctgttggggc | cgtgcttgag  | gagcaggccg | gcgacagcga | tgccggcgag  | cgcggcggca | 840  |
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| ccggtccgga | cgcagcgctc  | gagcagggac | tcgcggtgat | tgctgatgga  | ttggcgaaaa | 960  |
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| tgccggagcg | caaccactc   | actacagcag | agccatgtag | acaacatccc  | ctcccccttt | 1080 |
| ccaccgctc  | agacgcccg   | agcagccgc  | tacgggcttt | ttcatgccct  | gccctagcgt | 1140 |
| ccaagcctca | cggccgcgct  | cggcctctct | ggcggccttc | tgccgctctt  | ccgcttcctc | 1200 |
| gtcactgac  | tcgctgcgct  | cggtcgcttc | gctgcggcga | gcggtatcag  | ctcactcaaa | 1260 |
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| aggccagcaa | aaggccagga  | accgtaaaaa | ggccgcggtg | ctggcggttt  | tccataggct | 1380 |
| ccgccccct  | gacgagcatc  | acaaaaatcg | acgctcaagt | cagagggtgc  | gaaaccgcac | 1440 |
| aggactataa | agataccagg  | cgtttccccc | tggaagctcc | ctcgtgcgct  | ctcctgttcc | 1500 |
| gaccctgccg | cttaccggat  | acctgtccgc | ctttctccct | tcgggaagcg  | tgccgctttt | 1560 |
| ccgctgcata | accctgcttc  | ggggtcatta | tagcgatttt | ttcgggtatat | ccatcctttt | 1620 |
| tcgcacgata | tacaggattt  | tgccaaagg  | ttcgtgtaga | ctttccttgg  | tgtatccaac | 1680 |
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| ctaccgccgg | cgtaacagat  | gagggcaagc | ggatggctga | tgaaccaag   | ccaaccagga | 1860 |
| agggcagccc | acctatcaag  | gtgtactgcc | ttccagacga | acgaagagcg  | attgaggaaa | 1920 |
| agggcgccgc | ggccggcatg  | agcctgtcgg | cctacctgct | ggccgctcgg  | cagggctaca | 1980 |
| aaatcacggg | cgctcgtggac | tatgagcacg | tccgcgagct | ggcccgcatc  | aatggcgacc | 2040 |
| tgggcccgc  | ggcgggcctg  | ctgaaactct | ggctcaccga | cgaccgcgc   | acggcgcggt | 2100 |
| tcggtgatgc | cacgatcctc  | gccctgctgg | cgaagatcga | agagaagcag  | gacgagcttg | 2160 |

|            |             |            |             |             |            |      |
|------------|-------------|------------|-------------|-------------|------------|------|
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| gacttcgcgg | agctggtgaa  | gtacatcacc | gacgagcaag  | gcaagaccga  | gcgcctttgc | 2340 |
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<223> Plant expression vector

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<223> Plant expression vector with two promoter-terminator expression cassettes

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| ataatcaggc  | cgatgccgac  | agcgctcgagc | gcgacagtgc | tcagaattac | gatcaggggt  | 240  |
| atgttgggtt  | tcacgtctgg  | cctccggacc  | agcctccgct | ggtccgattg | aacgcgcgga  | 300  |
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<211> 13905

<212> DNA

<213> unknown

<220>

<221> misc\_feature

<223> Plant expression vector with three promoter-terminator expression cassettes

<400> 68



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| gcgcccagca  | caggtgcgca  | ggcaaattgc | accaacgc    | acagcgccag  | cagaatgcc   | 120  |
| tagtggcg    | tgacgtcg    | cgagtgaacc | agatcgcgca  | ggaggcccg   | cagcaccggc  | 180  |
| ataatcaggc  | cgatgccgac  | agcgtcgagc | gcgacagtgc  | tcagaattac  | gatcaggggt  | 240  |
| atgttgggtt  | tcacgtctgg  | cctccggacc | agcctccgct  | ggcccgattg  | aacgcgcgga  | 300  |
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Ser Lys Leu Ile Met Met Gly Met Phe Lys Ser Asn Lys Trp Phe Tyr
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gtc tac aag tgc ctc agc aac atg gcc att tgg gcc gcc gcc tgt gct      434
Val Tyr Lys Cys Leu Ser Asn Met Ala Ile Trp Ala Ala Ala Cys Ala
          130             135             140
ctc gtc ttt tac tcg gac cgc ttc tgg gta cac ctg gcc agc gcc gtc      482
Leu Val Phe Tyr Ser Asp Arg Phe Trp Val His Leu Ala Ser Ala Val
          145             150             155
atg ctg gga aca ttc ttt cag cag tcg gga tgg ttg gca cac gac ttt      530
Met Leu Gly Thr Phe Phe Gln Gln Ser Gly Trp Leu Ala His Asp Phe
          160             165             170
ctg cac cac cag gtc ttc acc aag cgc aag cac ggg gat ctc gga gga      578
Leu His His Gln Val Phe Thr Lys Arg Lys His Gly Asp Leu Gly Gly
          175             180             185             190
ctc ttt tgg ggg aac ctc atg cag ggt tac tcc gta cag tgg tgg aaa      626
Leu Phe Trp Gly Asn Leu Met Gln Gly Tyr Ser Val Gln Trp Trp Lys

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|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |  |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|--|------|
|     |     |     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |   |  |      |
| aac | aag | cac | aac | gga | cac | cac | gcc | gtc | ccc | aac | ctc | cac | tgc | tcc | tcc |   |  | 674  |
| Asn | Lys | His | Asn | Gly | His | His | Ala | Val | Pro | Asn | Leu | His | Cys | Ser | Ser |   |  |      |
|     |     |     | 210 |     |     |     | 215 |     |     |     |     |     | 220 |     |     |   |  |      |
| gca | gtc | gcg | caa | gat | ggg | gac | ccg | gac | atc | gat | acc | atg | ccc | ctt | ctc |   |  | 722  |
| Ala | Val | Ala | Gln | Asp | Gly | Asp | Pro | Asp | Ile | Asp | Thr | Met | Pro | Leu | Leu |   |  |      |
|     |     | 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |   |  |      |
| gcc | tgg | tcc | gtc | cag | caa | gcc | cag | tct | tac | cgg | gaa | ctc | caa | gcc | gac |   |  | 770  |
| Ala | Trp | Ser | Val | Gln | Gln | Ala | Gln | Ser | Tyr | Arg | Glu | Leu | Gln | Ala | Asp |   |  |      |
|     | 240 |     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     |   |  |      |
| gga | aag | gat | tcg | ggt | ttg | gtc | aag | ttc | atg | atc | cg  | aac | caa | tcc | tac |   |  | 818  |
| Gly | Lys | Asp | Ser | Gly | Leu | Val | Lys | Phe | Met | Ile | Arg | Asn | Gln | Ser | Tyr |   |  |      |
| 255 |     |     |     |     | 260 |     |     |     | 265 |     |     |     |     |     | 270 |   |  |      |
| ttt | tac | ttt | ccc | atc | ttg | ttg | ctc | gcc | cg  | ctg | tcg | tgg | ttg | aac | gag |   |  | 866  |
| Phe | Tyr | Phe | Pro | Ile | Leu | Leu | Leu | Ala | Arg | Leu | Ser | Trp | Leu | Asn | Glu |   |  |      |
|     |     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |   |  |      |
| tcc | ttc | aag | tgc | gcc | ttt | ggg | ctt | gga | gct | gcg | tcg | gag | aac | gct | gct |   |  | 914  |
| Ser | Phe | Lys | Cys | Ala | Phe | Gly | Leu | Gly | Ala | Ala | Ser | Glu | Asn | Ala | Ala |   |  |      |
|     |     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |   |  |      |
| ctc | gaa | ctc | aag | gcc | aag | ggt | ctt | cag | tac | ccc | ctt | ttg | gaa | aag | gct |   |  | 962  |
| Leu | Glu | Leu | Lys | Ala | Lys | Gly | Leu | Gln | Tyr | Pro | Leu | Leu | Glu | Lys | Ala |   |  |      |
|     |     | 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |   |  |      |
| ggc | atc | ctg | ctg | cac | tac | gct | tgg | atg | ctt | aca | gtt | tcg | tcc | ggc | ttt |   |  | 1010 |
| Gly | Ile | Leu | Leu | His | Tyr | Ala | Trp | Met | Leu | Thr | Val | Ser | Ser | Gly | Phe |   |  |      |
|     | 320 |     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     |   |  |      |
| gga | cg  | ttc | tcg | ttc | gcg | tac | acc | gca | ttt | tac | ttt | cta | acc | gcg | acc |   |  | 1058 |
| Gly | Arg | Phe | Ser | Phe | Ala | Tyr | Thr | Ala | Phe | Tyr | Phe | Leu | Thr | Ala | Thr |   |  |      |
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| gcg | tcc | tgt | gga | ttc | ttg | ctc | gcc | att | gtc | ttt | ggc | ctc | ggc | cac | aac |   |  | 1106 |
| Ala | Ser | Cys | Gly | Phe | Leu | Leu | Ala | Ile | Val | Phe | Gly | Leu | Gly | His | Asn |   |  |      |
|     |     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |   |  |      |
| ggc | atg | gcc | acc | tac | aat | gcc | gac | gcc | cg  | ccg | gac | ttc | tgg | aag | ctc |   |  | 1154 |
| Gly | Met | Ala | Thr | Tyr | Asn | Ala | Asp | Ala | Arg | Pro | Asp | Phe | Trp | Lys | Leu |   |  |      |
|     |     | 370 |     |     |     |     | 375 |     |     |     |     |     | 380 |     |     |   |  |      |
| caa | gtc | acc | acg | act | cg  | aac | gtc | acg | ggc | gga | cac | ggt | ttc | ccc | caa |   |  | 1202 |
| Gln | Val | Thr | Thr | Thr | Arg | Asn | Val | Thr | Gly | Gly | His | Gly | Phe | Pro | Gln |   |  |      |
|     |     | 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |   |  |      |
| gcc | ttt | gtc | gac | tgg | ttc | tgt | ggt | ggc | ctc | cag | tac | caa | gtc | gac | cac |   |  | 1250 |
| Ala | Phe | Val | Asp | Trp | Phe | Cys | Gly | Gly | Leu | Gln | Tyr | Gln | Val | Asp | His |   |  |      |
|     | 400 |     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     |   |  |      |
| cac | tta | ttc | ccc | agc | ctg | ccc | cga | cac | aat | ctg | gcc | aag | aca | cac | gca |   |  | 1298 |
| His | Leu | Phe | Pro | Ser | Leu | Pro | Arg | His | Asn | Leu | Ala | Lys | Thr | His | Ala |   |  |      |
| 415 |     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |   |  |      |
| ctg | gtc | gaa | tcg | ttc | tgc | aag | gag | tgg | ggt | gtc | cag | tac | cac | gaa | gcc |   |  | 1346 |
| Leu | Val | Glu | Ser | Phe | Cys | Lys | Glu | Trp | Gly | Val | Gln | Tyr | His | Glu | Ala |   |  |      |
|     |     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |   |  |      |
| gac | ctt | gtg | gac | ggg | acc | atg | gaa | gtc | ttg | cac | cat | ttg | ggc | agc | gtg |   |  | 1394 |
| Asp | Leu | Val | Asp | Gly | Thr | Met | Glu | Val | Leu | His | His | Leu | Gly | Ser | Val |   |  |      |
|     |     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |   |  |      |
| gcc | ggc | gaa | ttc | gtc | gtg | gat | ttt | gta | cg  | gat | gga | ccc | gcc | atg | taa | a |  | 1443 |
| Ala | Gly | Glu | Phe | Val | Val | Asp | Phe | Val | Arg | Asp | Gly | Pro | Ala | Met |     |   |  |      |
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&lt;210&gt; 70

&lt;211&gt; 477

&lt;212&gt; PRT

<213> *Phaeodactylum tricornutum*

&lt;400&gt; 70

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      20      25      30
Ala Trp Ile Ile His Ser Asn Lys Val Tyr Asp Val Ser Asn Trp His
      35      40      45
Glu His Pro Gly Gly Ala Val Ile Phe Thr His Ala Gly Asp Asp Met
      50      55      60
Thr Asp Ile Phe Ala Ala Phe His Ala Pro Gly Ser Gln Ser Leu Met
      65      70      75      80
Lys Lys Phe Tyr Ile Gly Glu Leu Leu Pro Glu Thr Thr Gly Lys Glu
      85      90      95
Pro Gln Gln Ile Ala Phe Glu Lys Gly Tyr Arg Asp Leu Arg Ser Lys
      100      105      110
Leu Ile Met Met Gly Met Phe Lys Ser Asn Lys Trp Phe Tyr Val Tyr
      115      120      125
Lys Cys Leu Ser Asn Met Ala Ile Trp Ala Ala Ala Cys Ala Leu Val
      130      135      140
Phe Tyr Ser Asp Arg Phe Trp Val His Leu Ala Ser Ala Val Met Leu
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Gly Thr Phe Phe Gln Gln Ser Gly Trp Leu Ala His Asp Phe Leu His
      165      170      175
His Gln Val Phe Thr Lys Arg Lys His Gly Asp Leu Gly Gly Leu Phe
      180      185      190
Trp Gly Asn Leu Met Gln Gly Tyr Ser Val Gln Trp Trp Lys Asn Lys
      195      200      205
His Asn Gly His His Ala Val Pro Asn Leu His Cys Ser Ser Ala Val
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Ala Gln Asp Gly Asp Pro Asp Ile Asp Thr Met Pro Leu Leu Ala Trp
      225      230      235      240
Ser Val Gln Gln Ala Gln Ser Tyr Arg Glu Leu Gln Ala Asp Gly Lys
      245      250      255
Asp Ser Gly Leu Val Lys Phe Met Ile Arg Asn Gln Ser Tyr Phe Tyr
      260      265      270
Phe Pro Ile Leu Leu Leu Ala Arg Leu Ser Trp Leu Asn Glu Ser Phe
      275      280      285
Lys Cys Ala Phe Gly Leu Gly Ala Ala Ser Glu Asn Ala Ala Leu Glu
      290      295      300
Leu Lys Ala Lys Gly Leu Gln Tyr Pro Leu Leu Glu Lys Ala Gly Ile
      305      310      315      320
Leu Leu His Tyr Ala Trp Met Leu Thr Val Ser Ser Gly Phe Gly Arg
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Phe Ser Phe Ala Tyr Thr Ala Phe Tyr Phe Leu Thr Ala Thr Ala Ser
      340      345      350
Cys Gly Phe Leu Leu Ala Ile Val Phe Gly Leu Gly His Asn Gly Met
      355      360      365
Ala Thr Tyr Asn Ala Asp Ala Arg Pro Asp Phe Trp Lys Leu Gln Val
      370      375      380
Thr Thr Thr Arg Asn Val Thr Gly Gly His Gly Phe Pro Gln Ala Phe
      385      390      395      400
Val Asp Trp Phe Cys Gly Gly Leu Gln Tyr Gln Val Asp His His Leu
      405      410      415
Phe Pro Ser Leu Pro Arg His Asn Leu Ala Lys Thr His Ala Leu Val

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|   |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|
|   | 420 |     | 425 |     | 430 |
| Glu Ser Phe Cys Lys Glu Trp Gly Val Gln Tyr His Glu Ala Asp Leu |     |     |     |     |     |
|   | 435 |     | 440 |     | 445 |
| Val Asp Gly Thr Met Glu Val Leu His His Leu Gly Ser Val Ala Gly |     |     |     |     |     |
|   | 450 |     | 455 |     | 460 |
| Glu Phe Val Val Asp Phe Val Arg Asp Gly Pro Ala Met             |     |     |     |     |     |
| 465   |     | 470 |     | 475 |     |

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<222> (4554)..(5987)

<223> *Phaeodactylum tricornutum* delta-6-desaturase

<220>

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<222> (2805)..(3653)

<223> *Caenorhabditis elegans* LPLAT

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<222> (1026)..(1898)

<223> *Physcomitrella patens* delta-6-elongase

<400> 71

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| cttttaata   | tccgattatt  | ctaataaacg | ctcttttctc | ttaggtttac | ccgccaatat  | 120  |
| atcctgtcaa  | acactgatag  | tttaaactga | aggcgggaaa | cgacaatctg | atcatgagcg  | 180  |
| gagaattaag  | ggagtcacgt  | tatgaccccc | gccgatgacg | cgggacaagc | cgttttacgt  | 240  |
| ttggaactga  | cagaaccgca  | acgttgaagg | agccactcag | ccgatctgaa | ttcatcgatc  | 300  |
| ctctagaggc  | gcgccgagct  | cctcgagcaa | atttacacat | tgccactaaa | cgtctaaacc  | 360  |
| cttgtaattt  | gtttttgttt  | tactatgtgt | gttatgtatt | tgatttgcga | taaattttta  | 420  |
| tatttggtac  | taaattttata | acacctttta | tgctaacggt | tgccaacact | tagcaatttg  | 480  |
| caagttgatt  | aattgattct  | aaattatttt | tgtcttctaa | atacatatac | taatcaactg  | 540  |
| gaaatgtaaa  | tatttgctaa  | tatttctact | ataggagaat | taaagtgagt | gaatatggta  | 600  |
| ccacaagggt  | tggagattta  | attggtgcaa | tgctgcatgg | atggcatata | caccaaaccat | 660  |
| tcaataattc  | ttgaggataa  | taatggtacc | acacaagatt | tgaggtgcat | gaacgtcacg  | 720  |
| tggacaaaag  | gtttagtaat  | ttttcaagac | aacaatgtta | ccacacacaa | gttttgaggt  | 780  |
| gcatgcatgg  | atgccctgtg  | gaaagttaa  | aaatatattg | gaaatgattt | gcatggaagc  | 840  |
| catgtgtaaa  | accatgacat  | ccacttggag | gatgcaataa | tgaagaaaac | tacaaattta  | 900  |
| catgcaacta  | gttatgcatg  | tagtctatat | aatgaggatt | ttgcaatact | ttcattcata  | 960  |
| cacactcact  | aagttttaca  | cgattataat | ttcttcatag | ccagcccacc | gcggtgggcg  | 1020 |
| gccgc atg gag gtc gtc gag aga ttc tac ggt gag ttg gat ggg aag gtc |             |            |            |            |             | 1070 |
| Met Glu Val Val Glu Arg Phe Tyr Gly Glu Leu Asp Gly Lys Val       |             |            |            |            |             |      |
| 1   | 5           | 10         | 15         |            |             |      |
| tcg cag ggc gtg aat gca ttg ctg ggt agt ttt ggg gtg gag ttg acg   |             |            |            |            |             | 1118 |
| Ser Gln Gly Val Asn Ala Leu Leu Gly Ser Phe Gly Val Glu Leu Thr   |             |            |            |            |             |      |
|   | 20          | 25         | 30         |            |             |      |
| gat acg ccc act acc aaa ggc ttg ccc ctc gtt gac agt ccc aca ccc   |             |            |            |            |             | 1166 |
| Asp Thr Pro Thr Thr Lys Gly Leu Pro Leu Val Asp Ser Pro Thr Pro   |             |            |            |            |             |      |



|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |      |
|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1938 |
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 Asp Tyr Cys Ala Ser Glu Met Lys Asn Arg Asn Leu Lys Leu Trp Val  
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| gtgcatgaac gtcacgtgga caaaaggttt agtaattttt caagacaaca atgttaccac    | 4303 |
| acacaagttt tgaggtgcat gcatggatgc cctgtggaaa gtttaaaaaat attttgaaa    | 4363 |
| tgatttgcat ggaagccatg tgtaaaacca tgacatccac ttggaggatg caataatgaa    | 4423 |
| gaaaactaca aatttacatg caactagtta tgcattgtatg ctatataatg aggattttgc   | 4483 |
| aatactttca ttcatacaca ctcactaagt tttacacgat tataattttct tcatagccag   | 4543 |
| cagatctaaa atg ggc aaa gga ggg gac gct cgg gcc tcg aag ggc tca       | 4592 |
| Met Gly Lys Gly Gly Asp Ala Arg Ala Ser Lys Gly Ser                  |      |
| 575 580 585  |      |
| acg gcg gct cgc aag atc agt tgg cag gaa gtc aag acc cac gcg tct      | 4640 |
| Thr Ala Ala Arg Lys Ile Ser Trp Gln Glu Val Lys Thr His Ala Ser      |      |
| 590 595 600  |      |
| ccg gag gac gcc tgg atc att cac tcc aat aag gtc tac gac gtg tcc      | 4688 |
| Pro Glu Asp Ala Trp Ile Ile His Ser Asn Lys Val Tyr Asp Val Ser      |      |
| 605 610 615  |      |
| aac tgg cac gaa cat ccc gga ggc gcc gtc att ttc acg cac gcc ggt      | 4736 |
| Asn Trp His Glu His Pro Gly Gly Ala Val Ile Phe Thr His Ala Gly      |      |
| 620 625 630  |      |
| gac gac atg acg gac att ttc gct gcc ttt cac gca ccc gga tcg cag      | 4784 |
| Asp Asp Met Thr Asp Ile Phe Ala Ala Phe His Ala Pro Gly Ser Gln      |      |
| 635 640 645  |      |
| tcg ctc atg aag aag ttc tac att ggc gaa ttg ctc ccg gaa acc acc      | 4832 |
| Ser Leu Met Lys Lys Phe Tyr Ile Gly Glu Leu Leu Pro Glu Thr Thr      |      |
| 650 655 660 665  |      |
| ggc aag gag ccg cag caa atc gcc ttt gaa aag ggc tac cgc gat ctg      | 4880 |
| Gly Lys Glu Pro Gln Gln Ile Ala Phe Glu Lys Gly Tyr Arg Asp Leu      |      |
| 670 675 680  |      |
| cgc tcc aaa ctc atc atg atg ggc atg ttc aag tcc aac aag tgg ttc      | 4928 |
| Arg Ser Lys Leu Ile Met Met Gly Met Phe Lys Ser Asn Lys Trp Phe      |      |
| 685 690 695  |      |
| tac gtc tac aag tgc ctc agc aac atg gcc att tgg gcc gcc gcc tgt      | 4976 |
| Tyr Val Tyr Lys Cys Leu Ser Asn Met Ala Ile Trp Ala Ala Ala Cys      |      |
| 700 705 710  |      |
| gct ctc gtc ttt tac tcg gac cgc ttc tgg gta cac ctg gcc agc gcc      | 5024 |
| Ala Leu Val Phe Tyr Ser Asp Arg Phe Trp Val His Leu Ala Ser Ala      |      |
| 715 720 725  |      |
| gtc atg ctg gga aca ttc ttt cag cag tcg gga tgg ttg gca cac gac      | 5072 |
| Val Met Leu Gly Thr Phe Phe Gln Gln Ser Gly Trp Leu Ala His Asp      |      |
| 730 735 740 745  |      |
| ttt ctg cac cac cag gtc ttc acc aag cgc aag cac ggg gat ctc gga      | 5120 |
| Phe Leu His His Gln Val Phe Thr Lys Arg Lys His Gly Asp Leu Gly      |      |
| 750 755 760  |      |
| gga ctc ttt tgg ggg aac ctc atg cag ggt tac tcc gta cag tgg tgg      | 5168 |

|            |            |         |     |         |     |         |          |            |            |     |     |      |     |      |     |      |
|------------|------------|---------|-----|---------|-----|---------|----------|------------|------------|-----|-----|------|-----|------|-----|------|
| Gly        | Leu        | Phe     | Trp | Gly     | Asn | Leu     | Met      | Gln        | Gly        | Tyr | Ser | Val  | Gln | Trp  | Trp |      |
|            |            |         | 765 |         |     |         |          | 770        |            |     |     |      | 775 |      |     |      |
| aaa        | aac        | aag     | cac | aac     | gga | cac     | cac      | gcc        | gtc        | ccc | aac | ctc  | cac | tgc  | tcc | 5216 |
| Lys        | Asn        | Lys     | His | Asn     | Gly | His     | His      | Ala        | Val        | Pro | Asn | Leu  | His | Cys  | Ser |      |
|            |            |         | 780 |         |     |         |          | 785        |            |     |     | 790  |     |      |     |      |
| tcc        | gca        | gtc     | gcg | caa     | gat | ggg     | gac      | ccg        | gac        | atc | gat | acc  | atg | ccc  | ctt | 5264 |
| Ser        | Ala        | Val     | Ala | Gln     | Asp | Gly     | Asp      | Pro        | Asp        | Ile | Asp | Thr  | Met | Pro  | Leu |      |
|            |            |         | 795 |         |     |         | 800      |            |            |     | 805 |      |     |      |     |      |
| ctc        | gcc        | tg      | tcc | gtc     | cag | caa     | gcc      | cag        | tct        | tac | cgg | gaa  | ctc | caa  | gcc | 5312 |
| Leu        | Ala        | Trp     | Ser | Val     | Gln | Gln     | Ala      | Gln        | Ser        | Tyr | Arg | Glu  | Leu | Gln  | Ala |      |
|            |            |         |     |         | 815 |         |          |            |            | 820 |     |      |     |      | 825 |      |
| gac        | gga        | aag     | gat | tcg     | gg  | ttg     | gtc      | aag        | ttc        | atg | atc | cgt  | aac | caa  | tcc | 5360 |
| Asp        | Gly        | Lys     | Asp | Ser     | Gly | Leu     | Val      | Lys        | Phe        | Met | Ile | Arg  | Asn | Gln  | Ser |      |
|            |            |         |     |         | 830 |         |          |            | 835        |     |     |      |     | 840  |     |      |
| tac        | ttt        | tac     | ttt | ccc     | atc | ttg     | ttg      | ctc        | gcc        | cgc | ctg | tcg  | tg  | ttg  | aac | 5408 |
| Tyr        | Phe        | Tyr     | Phe | Pro     | Ile | Leu     | Leu      | Leu        | Ala        | Arg | Leu | Ser  | Trp | Leu  | Asn |      |
|            |            |         |     |         | 845 |         |          | 850        |            |     |     |      | 855 |      |     |      |
| gag        | tcc        | ttc     | aag | tgc     | gcc | ttt     | ggg      | ctt        | gga        | gct | gcg | tcg  | gag | aac  | gct | 5456 |
| Glu        | Ser        | Phe     | Lys | Cys     | Ala | Phe     | Gly      | Leu        | Gly        | Ala | Ala | Ser  | Glu | Asn  | Ala |      |
|            |            |         |     |         | 860 |         | 865      |            |            |     |     | 870  |     |      |     |      |
| gct        | ctc        | gaa     | ctc | aag     | gcc | aag     | gg       | ctt        | cag        | tac | ccc | ctt  | ttg | gaa  | aag | 5504 |
| Ala        | Leu        | Glu     | Leu | Lys     | Ala | Lys     | Gly      | Leu        | Gln        | Tyr | Pro | Leu  | Leu | Glu  | Lys |      |
|            |            |         |     |         |     | 880     |          |            |            |     | 885 |      |     |      |     |      |
| gct        | ggc        | atc     | ctg | ctg     | cac | tac     | gct      | tg         | atg        | ctt | aca | gtt  | tcg | tcc  | ggc | 5552 |
| Ala        | Gly        | Ile     | Leu | Leu     | His | Tyr     | Ala      | Trp        | Met        | Leu | Thr | Val  | Ser | Ser  | Gly |      |
|            |            |         |     |         | 895 |         |          |            | 900        |     |     |      |     |      | 905 |      |
| ttt        | gga        | cgc     | ttc | tcg     | ttc | gcg     | tac      | acc        | gca        | ttt | tac | ttt  | cta | acc  | gcg | 5600 |
| Phe        | Gly        | Arg     | Phe | Ser     | Phe | Ala     | Tyr      | Thr        | Ala        | Phe | Tyr | Phe  | Leu | Thr  | Ala |      |
|            |            |         |     |         | 910 |         |          |            | 915        |     |     |      |     | 920  |     |      |
| acc        | gcg        | tcc     | tgt | gga     | ttc | ttg     | ctc      | gcc        | att        | gtc | ttt | ggc  | ctc | ggc  | cac | 5648 |
| Thr        | Ala        | Ser     | Cys | Gly     | Phe | Leu     | Leu      | Ala        | Ile        | Val | Phe | Gly  | Leu | Gly  | His |      |
|            |            |         |     |         | 925 |         |          | 930        |            |     |     |      | 935 |      |     |      |
| aac        | ggc        | atg     | gcc | acc     | tac | aat     | gcc      | gac        | gcc        | cgt | ccg | gac  | ttc | tg   | aag | 5696 |
| Asn        | Gly        | Met     | Ala | Thr     | Tyr | Asn     | Ala      | Asp        | Ala        | Arg | Pro | Asp  | Phe | Trp  | Lys |      |
|            |            |         |     |         |     |         | 945      |            |            |     |     | 950  |     |      |     |      |
| ctc        | caa        | gtc     | acc | acg     | act | cgc     | aac      | gtc        | acg        | ggc | gga | cac  | gg  | ttc  | ccc | 5744 |
| Leu        | Gln        | Val     | Thr | Thr     | Thr | Arg     | Asn      | Val        | Thr        | Gly | Gly | His  | Gly | Phe  | Pro |      |
|            |            |         |     |         |     | 960     |          |            |            |     | 965 |      |     |      |     |      |
| caa        | gcc        | ttt     | gtc | gac     | tg  | ttc     | tgt      | gg         | ggc        | ctc | cag | tac  | caa | gtc  | gac | 5792 |
| Gln        | Ala        | Phe     | Val | Asp     | Trp | Phe     | Cys      | Gly        | Gly        | Leu | Gln | Tyr  | Gln | Val  | Asp |      |
|            |            |         |     |         |     | 975     |          |            | 980        |     |     |      |     |      | 985 |      |
| cac        | cac        | tta     | ttc | ccc     | agc | ctg     | ccc      | cga        | cac        | aat | ctg | gcc  | aag | aca  | cac | 5840 |
| His        | His        | Leu     | Phe | Pro     | Ser | Leu     | Pro      | Arg        | His        | Asn | Leu | Ala  | Lys | Thr  | His |      |
|            |            |         |     | 990     |     |         |          | 995        |            |     |     |      |     | 1000 |     |      |
| gca        | ctg        | gtc     | gaa | tcg     | ttc | tgc     | aag      | gag        | tg         | gg  | gtc | cag  | tac | cac  |     | 5885 |
| Ala        | Leu        | Val     | Glu | Ser     | Phe | Cys     | Lys      | Glu        | Trp        | Gly | Val | Gln  | Tyr | His  |     |      |
|            |            |         |     | 1005    |     |         |          | 1010       |            |     |     | 1015 |     |      |     |      |
| gaa        | gcc        | gac     | ctt | gtg     | gac | ggg     | acc      | atg        | gaa        | gtc | ttg | cac  | cat | ttg  |     | 5930 |
| Glu        | Ala        | Asp     | Leu | Val     | Asp | Gly     | Thr      | Met        | Glu        | Val | Leu | His  | His | Leu  |     |      |
|            |            |         |     | 1020    |     |         |          | 1025       |            |     |     | 1030 |     |      |     |      |
| ggc        | agc        | gtg     | gcc | ggc     | gaa | ttc     | gtc      | gtg        | gat        | ttt | gta | cgc  | gat | gga  |     | 5975 |
| Gly        | Ser        | Val     | Ala | Gly     | Glu | Phe     | Val      | Val        | Asp        | Phe | Val | Arg  | Asp | Gly  |     |      |
|            |            |         |     | 1035    |     |         |          | 1040       |            |     |     | 1045 |     |      |     |      |
| ccc        | gcc        | atg     | taa | agatctg | ccg | gc      | atcgatcc | cgggccatgg | cctgctttaa |     |     |      |     |      |     | 6027 |
| Pro        | Ala        | Met     |     |         |     |         |          |            |            |     |     |      |     |      |     |      |
| tgagatatgc | gagacgccta | tgatcgc | atg | atatttg | ctt | tcaattt | ctgt     | tgtgcac    | gtt        |     |     |      |     |      |     | 6087 |

|             |             |             |            |             |             |      |
|-------------|-------------|-------------|------------|-------------|-------------|------|
| gtaaaaaacc  | tgagcatgtg  | tagctcagat  | ccttaccgcc | ggtttcgggt  | cattctaattg | 6147 |
| aatatatcac  | ccgttactat  | cgtattttta  | tgaataatat | tctccgttca  | atttactgat  | 6207 |
| tgtccgtcga  | cgagctcggc  | gcgccgtcga  | cctgcaggca | tgcaagcttc  | acgctgccgc  | 6267 |
| aagcactcag  | ggcgcaagg   | ctgctaaagg  | aagcggaaca | cgtagaaagc  | cagtccgcag  | 6327 |
| aaacggtgct  | gaccccggt   | gaatgtcagc  | tactgggcta | tctggacaag  | ggaaaacgca  | 6387 |
| agcgcaaaaga | gaaagcaggt  | agcttgagct  | gggcttacat | ggcgatagct  | agactgggag  | 6447 |
| gttttatgga  | cagcaagcga  | accggaattg  | ccagctgggg | cgccctctgg  | taaggttggg  | 6507 |
| aagccctgca  | aagtaaactg  | gatggctttc  | ttgccgccaa | ggatctgatg  | gcgcagggga  | 6567 |
| tcaagatcat  | gagcggagaa  | ttaagggagt  | cacgttatga | ccccgccga   | tgacgcggga  | 6627 |
| caagccggtt  | tacgtttgga  | actgacagaa  | ccgcaacgtt | gaaggagcca  | ctcagccgcg  | 6687 |
| ggtttctgga  | gtttaatgag  | ctaagcacat  | acgtcagaaa | ccattattgc  | gcgttcaaaa  | 6747 |
| gtcgcctaag  | gtcactatca  | gctagcaaat  | atttcttgct | aaaaatgctc  | caactgacgtt | 6807 |
| ccataaattc  | ccctcggtat  | ccaattagag  | tctcatattc | actctcaatc  | cagatctcga  | 6867 |
| ctctagtcca  | gggcccattg  | gagcttggtg  | tgaacaagat | ggattgcacg  | caggttctcc  | 6927 |
| ggccgcttgg  | gtggagaggc  | tattcggcta  | tgactgggca | caacagacaa  | tccggtctgc  | 6987 |
| tgatgccgcc  | gtgttcgggc  | tgtcagcgca  | ggggcgcccg | gttctttttg  | tcaagaccga  | 7047 |
| cctgtccggt  | gccctgaatg  | aactgcagga  | cgaggcagcg | cggctatcgt  | ggctggccac  | 7107 |
| gacgggaggt  | ccttgccgag  | ctgtgctcga  | cgttgctact | gaagcgggaa  | gggactggct  | 7167 |
| gctattgggc  | gaagtgcggg  | ggcaggatct  | cctgtcatct | caccttgctc  | ctgccgagaa  | 7227 |
| agtatccatc  | atggctgatg  | caatgcggcg  | gctgcatacg | cttgatccgg  | ctacctgccc  | 7287 |
| attcgaccac  | caagcgaaac  | atcgcatcga  | gcgagcacgt | actcggatgg  | aagccggtct  | 7347 |
| tgatgatcag  | gatgatctgg  | acgaagagca  | tcaggggctc | gcgccagccg  | aactgttcgc  | 7407 |
| caggctcaag  | gcgcgcatgc  | ccgacggcga  | ggatctcgtc | gtgacccatg  | gcgatgcctg  | 7467 |
| cttgccgaat  | atcatggtgg  | aaaatggccg  | cttttctgga | ttcatcgact  | gtggccggct  | 7527 |
| gggtgtggcg  | gaccgctatc  | aggacatagc  | gttggtacc  | cgtgatattg  | ctgaagagct  | 7587 |
| tggcgggcga  | tgggctgacc  | gcttccctcg  | gctttacggg | atcgccgctc  | ccgattcgca  | 7647 |
| gcgcacgcgc  | ttctatcgcc  | ttcttgacga  | gttcttctga | gcgggaccca  | agctagcttc  | 7707 |
| gacggatccc  | ccgatgagct  | aagctagcta  | tatcatcaat | ttatgtatta  | cacataatat  | 7767 |
| cgcactcagt  | ctttcatcta  | cggcaatgta  | ccagctgata | taatcagtta  | ttgaaatatt  | 7827 |
| tctgaattta  | aaattgcatc  | aataaattta  | tgtttttgct | tggaactata  | tacctgactt  | 7887 |
| gttattttat  | caataaatat  | ttaaactata  | tttctttcaa | gatgggaatt  | aattcactgg  | 7947 |
| ccgtcgtttt  | acaacgtcgt  | gactgggaaa  | accctggcgt | tacccaactt  | aatcgccctg  | 8007 |
| cagcacatcc  | cccttcgcc   | agctggcgta  | atagcgaaga | ggcccgccac  | gatcgccctt  | 8067 |
| cccaacagtt  | gcgcagcctg  | aatggcgccc  | gctcctttcg | ctttcttccc  | ttcctttctc  | 8127 |
| gccacgttcg  | ccggctttcc  | ccgtcaagct  | ctaaatcggg | ggctcccttt  | agggttccga  | 8187 |
| tttagtgctt  | tacggcacct  | cgaccccaaa  | aaacttgatt | tgggtgatgg  | ttcacgtagt  | 8247 |
| gggccatcgc  | cctgatagac  | ggtttttcgc  | cctttgacgt | tggagtccac  | gttctttaat  | 8307 |
| agtggactct  | tggtccaaac  | tggaacaaca  | ctcaacccta | tctcgggcta  | ttcttttgat  | 8367 |
| ttataaggga  | ttttgccgat  | ttcggaacca  | ccatcaaaca | ggattttcgc  | ctgctggggc  | 8427 |
| aaaccagcgt  | ggaccgcttg  | ctgcaactct  | ctcagggcca | ggcgggtaag  | ggcaatcagc  | 8487 |
| tggtgcccgt  | ctcactgggtg | aaaagaaaaa  | ccaccccgat | acattaaaaa  | cgtccgcaat  | 8547 |
| gtgttattaa  | gttgtctaag  | cgtcaatttg  | tttacaccac | aatataatct  | gccaccagcc  | 8607 |
| agccaacagc  | tccccgaccg  | gcagctcggc  | acaaaatcac | cactcgatac  | aggcagccca  | 8667 |
| tcagtccggg  | acggcgctcag | cgggagagcc  | gttgtaaggc | ggcagacttt  | gctcatgtta  | 8727 |
| ccgatgctat  | tcggaagaac  | ggcaactaag  | ctgccgggtt | tgaaacacgg  | atgatctcgc  | 8787 |
| ggagggtagc  | atgttgattg  | taacgatgac  | agagcgttgc | tgctgtgat   | caaatatcat  | 8847 |
| ctccctcgca  | gagatccgaa  | ttatcagcct  | tcttattcat | ttctcgctta  | accgtgacag  | 8907 |
| gctgtcgatc  | ttgagaacta  | tgccgacata  | ataggaaatc | gctgggataaa | gccgctgagg  | 8967 |
| aagctgagtg  | gcgctatttc  | ttagaagtg   | aacgttgacg | atatcaactc  | ccctatccat  | 9027 |
| tgctcaccga  | atggtacagg  | tcggggaccc  | gaagttccga | ctgtcggcct  | gatgcacccc  | 9087 |
| cggctgatcg  | accccagatc  | tggggctgag  | aaagcccgat | aaggaaacaa  | ctgtagggtc  | 9147 |
| gagtcgcgag  | atcccccgga  | accaaaggaa  | gtaggttaaa | cccgtccga   | tcaggccgag  | 9207 |
| ccacgccagg  | ccgagaacat  | tggttcctgt  | aggcatcggg | attggcggat  | caaacactaa  | 9267 |
| agctactgga  | acgagcagaa  | gtcctccggc  | cgccagttgc | caggcggtaa  | aggtgagcag  | 9327 |
| aggcacggga  | ggttgccact  | tgccgggtcag | cacggttccg | aacgccatgg  | aaaccgcccc  | 9387 |
| cgccaggccc  | gctgcgacgc  | cgacaggatc  | tagcgtcgcg | tttggtgtca  | acaccaacag  | 9447 |
| cgccacgccc  | gcagttccgc  | aaatagcccc  | caggaccgcc | atcaatcgta  | tcgggctacc  | 9507 |

|            |            |            |             |             |             |       |
|------------|------------|------------|-------------|-------------|-------------|-------|
| tagcagagcg | gcagagatga | acacgaccat | cagcggtgc   | acagcgcta   | ccgtcgccgc  | 9567  |
| gaccccgccc | ggcaggcggt | agaccgaaat | aaacaacaag  | ctccagaata  | gcgaaatatt  | 9627  |
| aagtgcgccc | aggatgaaga | tgcgcatcca | ccagattccc  | gttggaatct  | gtcggacgat  | 9687  |
| catcacgagc | aataaaccgc | ccggcaacgc | ccgcagcagc  | ataccggcga  | cccctcggcc  | 9747  |
| tcgctgttcg | ggctccacga | aaacgccgga | cagatgcgcc  | ttgtgagcgt  | ccttggggcc  | 9807  |
| gtcctcctgt | ttgaagaccg | acagcccaat | gatctcgccg  | tcgatgtagg  | cgccgaatgc  | 9867  |
| cacggcatct | cgcaaccgtt | cagcgaacgc | ctccatgggc  | tttttctcct  | cgtgctcgta  | 9927  |
| aacggacccg | aacatctctg | gagctttctt | cagggccgac  | aatcggatct  | cgcggaatc   | 9987  |
| ctgcacgtcg | gccgctccaa | gccgtcgaat | ctgagcctta  | atcacaattg  | tcaattttaa  | 10047 |
| tcctctgttt | atcggcagtt | cgtagagcgc | gccgtgcgtc  | ccgagcgata  | ctgagcgaag  | 10107 |
| caagtgcgtc | gagcagtgcc | cgcttggttc | tgaatgcca   | gtaaagcgct  | ggctgctgaa  | 10167 |
| ccccagccg  | gaactgacc  | cacaaggccc | tagcgtttgc  | aatgcaccag  | gtcatcattg  | 10227 |
| accgaggcgt | gttccaccag | gccgctgcct | cgcaactctt  | cgaggcttc   | gccgacctgc  | 10287 |
| tcgcgccact | tcttcacgcg | ggtggaatcc | gatccgcaca  | tgaggcgga   | ggtttccagc  | 10347 |
| ttgagcgggt | acggctcccg | gtgcgagctg | aaatagtcga  | acatccgtcg  | ggcgtcggc   | 10407 |
| gacagcttgc | ggtacttctc | ccatatgaat | ttcgtgtagt  | ggtcgccagc  | aaacagcacg  | 10467 |
| acgatttctt | cgtcgatcag | gacctggcaa | cgggacgttt  | tcttgccacg  | gtccaggacg  | 10527 |
| cggaagcggg | gcagcagcga | caccgattcc | aggtgcccaa  | cgcggtcggg  | cgtgaagccc  | 10587 |
| atcgccgtcg | cctgtaggcg | cgacaggcat | tcctcggcct  | tcgtgtaata  | ccggccattg  | 10647 |
| atcgaccagc | ccaggtcctg | gcaaagctcg | tagaacgtga  | aggtgatcgg  | ctcgccgata  | 10707 |
| ggggtgcgct | tcgcgtactc | caacacctgc | tgccacacca  | gttcgtcatc  | gtcggcccgc  | 10767 |
| agctcgacgc | cggtgtaggt | gatcttcacg | tccttggtga  | cgtggaaaat  | gaccttggtt  | 10827 |
| tgacgcgct  | cgcgcgggat | tttcttggtg | cgcgtgggtg  | acagggcaga  | gcgggccgtg  | 10887 |
| tcgtttggca | tcgctcgcat | cgtgtccggc | cacggcgcaa  | tatcgaacaa  | ggaaagctgc  | 10947 |
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<210> 72

<211> 290

<212> PRT

<213> *Phaeodactylum tricornutum*, *Physcomitrella patens*, *Caenorhabditis elegans*

<400> 72

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          20          25          30
Thr Pro Thr Thr Lys Gly Leu Pro Leu Val Asp Ser Pro Thr Pro Ile
          35          40          45
Val Leu Gly Val Ser Val Tyr Leu Thr Ile Val Ile Gly Gly Leu Leu
          50          55          60
Trp Ile Lys Ala Arg Asp Leu Lys Pro Arg Ala Ser Glu Pro Phe Leu
65          70          75          80
Leu Gln Ala Leu Val Leu Val His Asn Leu Phe Cys Phe Ala Leu Ser
          85          90          95
Leu Tyr Met Cys Val Gly Ile Ala Tyr Gln Ala Ile Thr Trp Arg Tyr
          100          105          110
Ser Leu Trp Gly Asn Ala Tyr Asn Pro Lys His Lys Glu Met Ala Ile
          115          120          125
Leu Val Tyr Leu Phe Tyr Met Ser Lys Tyr Val Glu Phe Met Asp Thr
          130          135          140
Val Ile Met Ile Leu Lys Arg Ser Thr Arg Gln Ile Ser Phe Leu His
145          150          155          160
Val Tyr His His Ser Ser Ile Ser Leu Ile Trp Trp Ala Ile Ala His
          165          170          175
His Ala Pro Gly Gly Glu Ala Tyr Trp Ser Ala Ala Leu Asn Ser Gly
          180          185          190
Val His Val Leu Met Tyr Ala Tyr Tyr Phe Leu Ala Ala Cys Leu Arg
          195          200          205
Ser Ser Pro Lys Leu Lys Asn Lys Tyr Leu Phe Trp Gly Arg Tyr Leu
210          215          220
Thr Gln Phe Gln Met Phe Gln Phe Met Leu Asn Leu Val Gln Ala Tyr
225          230          235          240
Tyr Asp Met Lys Thr Asn Ala Pro Tyr Pro Gln Trp Leu Ile Lys Ile
          245          250          255
Leu Phe Tyr Tyr Met Ile Ser Leu Leu Phe Leu Phe Gly Asn Phe Tyr
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Val Gln Lys Tyr Ile Lys Pro Ser Asp Gly Lys Gln Lys Gly Ala Lys
275          280          285

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Thr Glu  
290

<210> 73

<211> 282

<212> PRT

<213> Phaeodactylum tricornutum, Physcomitrella patens, Caenorhabditis elegans

<400> 73

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|------------|------------|-----|------------|------------|-----------|------------|------------|------------|------------|------------|------------|-----------|------------|------------|------------|
| Met<br>1   | Glu        | Asn | Phe        | Trp<br>5   | Ser       | Ile        | Val        | Val        | Phe<br>10  | Phe        | Leu        | Leu       | Ser        | Ile<br>15  | Leu        |
| Phe        | Ile        | Leu | Tyr        | Asn<br>20  | Ile       | Ser        | Thr        | Val<br>25  | Cys        | His        | Tyr        | Tyr       | Met<br>30  | Arg        | Ile        |
| Ser        | Phe        | Tyr | Tyr        | Phe<br>35  | Thr       | Ile        | Leu<br>40  | Leu        | His        | Gly        | Met        | Glu<br>45 | Val        | Cys        | Val        |
| Thr        | Met<br>50  | Ile | Pro        | Ser        | Trp<br>55 | Leu        | Asn        | Gly        | Lys        | Gly        | Ala<br>60  | Asp       | Tyr        | Val        | Phe        |
| His<br>65  | Ser        | Phe | Phe        | Tyr<br>70  | Trp       | Cys        | Lys        | Trp        | Thr        | Gly<br>75  | Val        | His       | Thr        | Thr        | Val<br>80  |
| Tyr        | Gly        | Tyr | Glu        | Lys<br>85  | Thr       | Gln        | Val        | Glu        | Gly<br>90  | Pro        | Ala        | Val       | Val        | Ile<br>95  | Cys        |
| Asn        | His        | Gln | Ser<br>100 | Ser        | Leu       | Asp        | Ile        | Leu<br>105 | Ser        | Met        | Ala        | Ser       | Ile<br>110 | Trp        | Pro        |
| Lys        | Asn<br>115 | Cys | Val        | Val        | Met       | Met        | Lys<br>120 | Arg        | Ile        | Leu        | Ala<br>125 | Tyr       | Val        | Pro        | Phe        |
| Phe        | Asn<br>130 | Leu | Gly        | Ala        | Tyr       | Phe<br>135 | Ser        | Asn        | Thr        | Ile        | Phe<br>140 | Ile       | Asp        | Arg        | Tyr        |
| Asn<br>145 | Arg        | Glu | Arg        | Ala<br>150 | Met       | Ala        | Ser        | Val        | Asp        | Tyr<br>155 | Cys        | Ala       | Ser        | Glu        | Met<br>160 |
| Lys        | Asn        | Arg | Asn<br>165 | Leu        | Lys       | Leu        | Trp        | Val        | Phe<br>170 | Pro        | Glu        | Gly       | Thr        | Arg<br>175 | Asn        |
| Arg        | Glu        | Gly | Gly<br>180 | Phe        | Ile       | Pro        | Phe        | Lys<br>185 | Lys        | Gly        | Ala        | Phe       | Asn<br>190 | Ile        | Ala        |
| Val        | Arg<br>195 | Ala | Gln        | Ile        | Pro       | Ile        | Ile<br>200 | Pro        | Val        | Val        | Phe<br>205 | Ser       | Asp        | Tyr        | Arg        |
| Asp        | Phe<br>210 | Tyr | Ser        | Lys        | Pro       | Gly<br>215 | Arg        | Tyr        | Phe        | Lys        | Asn<br>220 | Asp       | Gly        | Glu        | Val        |
| Val<br>225 | Ile        | Arg | Val        | Leu<br>230 | Asp       | Ala        | Ile        | Pro        | Thr        | Lys<br>235 | Gly        | Leu       | Thr        | Leu        | Asp<br>240 |
| Asp        | Val        | Ser | Glu<br>245 | Leu        | Ser       | Asp        | Met        | Cys        | Arg        | Asp        | Val        | Met       | Leu        | Ala<br>255 | Ala        |
| Tyr        | Lys        | Glu | Val<br>260 | Thr        | Leu       | Glu        | Ala        | Gln<br>265 | Arg        | Asn        | Ala        | Thr       | Arg        | Arg        |            |
| Gly        | Glu<br>275 | Thr | Lys        | Asp        | Gly       | Lys        | Lys<br>280 | Ser        | Glu        |            |            |           |            |            |            |

<210> 74

<211> 477

<212> PRT

<213> Phaeodactylum tricornutum, Physcomitrella patens, Caenorhabditis elegans

<400> 74

Met Gly Lys Gly Gly Asp Ala Arg Ala Ser Lys Gly Ser Thr Ala Ala

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Arg | Lys | Ile | Ser | Trp | Gln | Glu | Val | Lys | Thr | His | Ala | Ser | Pro | Glu | Asp |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Ala | Trp | Ile | Ile | His | Ser | Asn | Lys | Val | Tyr | Asp | Val | Ser | Asn | Trp | His |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Glu | His | Pro | Gly | Gly | Ala | Val | Ile | Phe | Thr | His | Ala | Gly | Asp | Asp | Met |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Thr | Asp | Ile | Phe | Ala | Ala | Phe | His | Ala | Pro | Gly | Ser | Gln | Ser | Leu | Met |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Lys | Lys | Phe | Tyr | Ile | Gly | Glu | Leu | Leu | Pro | Glu | Thr | Thr | Gly | Lys | Glu |
|     |     |     | 85  |     |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Pro | Gln | Gln | Ile | Ala | Phe | Glu | Lys | Gly | Tyr | Arg | Asp | Leu | Arg | Ser | Lys |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Leu | Ile | Met | Met | Gly | Met | Phe | Lys | Ser | Asn | Lys | Trp | Phe | Tyr | Val | Tyr |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Lys | Cys | Leu | Ser | Asn | Met | Ala | Ile | Trp | Ala | Ala | Ala | Cys | Ala | Leu | Val |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Phe | Tyr | Ser | Asp | Arg | Phe | Trp | Val | His | Leu | Ala | Ser | Ala | Val | Met | Leu |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     | 160 |     |
| Gly | Thr | Phe | Phe | Gln | Gln | Ser | Gly | Trp | Leu | Ala | His | Asp | Phe | Leu | His |
|     |     |     |     | 165 |     |     |     | 170 |     |     |     |     |     | 175 |     |
| His | Gln | Val | Phe | Thr | Lys | Arg | Lys | His | Gly | Asp | Leu | Gly | Gly | Leu | Phe |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Trp | Gly | Asn | Leu | Met | Gln | Gly | Tyr | Ser | Val | Gln | Trp | Trp | Lys | Asn | Lys |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| His | Asn | Gly | His | His | Ala | Val | Pro | Asn | Leu | His | Cys | Ser | Ser | Ala | Val |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Ala | Gln | Asp | Gly | Asp | Pro | Asp | Ile | Asp | Thr | Met | Pro | Leu | Leu | Ala | Trp |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     | 240 |     |
| Ser | Val | Gln | Gln | Ala | Gln | Ser | Tyr | Arg | Glu | Leu | Gln | Ala | Asp | Gly | Lys |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Asp | Ser | Gly | Leu | Val | Lys | Phe | Met | Ile | Arg | Asn | Gln | Ser | Tyr | Phe | Tyr |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Phe | Pro | Ile | Leu | Leu | Leu | Ala | Arg | Leu | Ser | Trp | Leu | Asn | Glu | Ser | Phe |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Lys | Cys | Ala | Phe | Gly | Leu | Gly | Ala | Ala | Ser | Glu | Asn | Ala | Ala | Leu | Glu |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Leu | Lys | Ala | Lys | Gly | Leu | Gln | Tyr | Pro | Leu | Leu | Glu | Lys | Ala | Gly | Ile |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320 |     |
| Leu | Leu | His | Tyr | Ala | Trp | Met | Leu | Thr | Val | Ser | Ser | Gly | Phe | Gly | Arg |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Phe | Ser | Phe | Ala | Tyr | Thr | Ala | Phe | Tyr | Phe | Leu | Thr | Ala | Thr | Ala | Ser |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Cys | Gly | Phe | Leu | Leu | Ala | Ile | Val | Phe | Gly | Leu | Gly | His | Asn | Gly | Met |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Ala | Thr | Tyr | Asn | Ala | Asp | Ala | Arg | Pro | Asp | Phe | Trp | Lys | Leu | Gln | Val |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Thr | Thr | Thr | Arg | Asn | Val | Thr | Gly | Gly | His | Gly | Phe | Pro | Gln | Ala | Phe |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     | 400 |     |
| Val | Asp | Trp | Phe | Cys | Gly | Gly | Leu | Gln | Tyr | Gln | Val | Asp | His | His | Leu |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Phe | Pro | Ser | Leu | Pro | Arg | His | Asn | Leu | Ala | Lys | Thr | His | Ala | Leu | Val |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Glu | Ser | Phe | Cys | Lys | Glu | Trp | Gly | Val | Gln | Tyr | His | Glu | Ala | Asp | Leu |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Val | Asp | Gly | Thr | Met | Glu | Val | Leu | His | His | Leu | Gly | Ser | Val | Ala | Gly |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |

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<210> 78  
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<223> USP1 downstream

<400> 78

aaaactgcag gcggccgccc accgcggtgg gctggctatg aagaaatt

48

<210> 79

<211> 27

<212> DNA

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<222> (1)..(27)

<223> USP2 downstream

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27

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<223> USP3 downstream

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45

<210> 81

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<220>

<221> misc\_feature

<222> (1)..(40)

<223> OCS1 upstream

<400> 81

aaaactgcag tctagaaggc ctctgcttt aatgagatat

40

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<212> DNA

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 <210> 83  
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 tcccccgggc catggcctgc tttaatgaga tat 33  
  
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47

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29

<210> 88

<211> 24

<212> DNA

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ttactcagat ttcttcccgt cttt

24

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<212> DNA

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26

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24

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32

<210> 92  
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31

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41

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41

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18

<210> 96  
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19

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 <223> primer

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18

<210> 98  
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18

<210> 99  
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19

<210> 100  
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 <222> (1)..(25)  
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<400> 100  
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25

<210> 101  
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 <223> ACtrau-3 stop  
  
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 <400> 103  
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 <223> YES-HIS-3  
  
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18

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19

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<400> 107  
 atggatgaat ccaccacgac catcagcccg atgcttgctg c

41

<210> 108  
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 <222> (1)..(40)  
 <223> MaLPAAT1.2

<400> 108  
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 <222> (1)..(37)  
 <223> ShLPAAT

<400> 109  
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 <222> (1)..(46)  
 <223> T6

<400> 110  
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<210> 111  
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41

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39

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39

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41

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27

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52

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60

ggtcggacgt ac

72